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ABSTRACT

The National Science Foundation (NSF) provides awards for education and research in the sciences, mathematics, and engineering. This publication contains information on fiscal year 1986 awards. An introductory section reviews the goals of NSF's education program and the long-range goals of the Directorate for Science and Engineering Education. Data on fiscal appropriations are provided and the directorate staff and advisory committee are identified. An index lists the awards alphabetically by state and specifies the institution, project director, and discipline addressed. Information on each award includes: (1) project director's name; (2) institution; (3) award number; (4) award amount; (5) time duration; (6) discipline area; and (7) project title and abstract. Appendices contain lists of graduate fellowship awards, minority graduate fellowship awards and NATO postdoctoral fellowship awards. (ML)

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National
Science
Foundation

Directorate for
Science and
Engineering Education

April 1987

ED282723

Directory of Awards

FY 1986

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The National Science Foundation provides awards for education and research in the sciences, mathematics, and engineering. The Foundation welcomes proposals from all qualified educators, scientists, mathematicians, and engineers, and strongly encourages women, minorities, and the physically disabled to compete fully in the Programs described in this document.

In accordance with Federal statutes and regulations and NSF policies, no person on grounds of race, color, age, sex, national origin or physical disability shall be excluded from participation in, denied benefits of, or be subject to discrimination under any program or activity receiving financial assistance from the National Science Foundation.

The grantee is wholly responsible for the conduct of supported research and education activities, and preparation of the results for publication. The Foundation, therefore, does not assume responsibility for such findings or their interpretation.

NSF has TDD (Telephonic Device for the Deaf) capability which enables individuals with hearing impairments to communicate with the Division of Personnel Management for information relating to NSF programs, employment, or general information. This telephone number is (202) 357-7492.

Cover: "DNA Molecules"
1985 Waterman Award Winner
Jacqueline K. Barton

"Carbon Filament"
Courtesy of The Exploratorium
Photograph by Esther Kutnick

Other Publications of Interest:

Program Announcements and Guidelines:

Division of Materials Development, Research, and Informal Science Education	NSF 87-12
Division of Teacher Preparation and Enhancement	NSF 87-10
Division of Research Career Development:	
Graduate Fellowships	NSF 86-46
Minority Graduate Fellowships	NSF 86-47
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INTRODUCTION

The National Science Foundation Act of 1950 (as amended) authorizes and directs the Foundation to initiate and support basic research, programs to strengthen research potential, and science, mathematics, and engineering education programs at all levels. Since its inception the Foundation has funded a wide variety of projects designed to enhance the quality and effectiveness of such education in schools, colleges, and universities.

The goals of NSF's education programming are:

- to develop and to broaden the group of students who are well prepared and highly motivated to pursue careers in mathematics, engineering, and the sciences, and to improve the quality of the educational experience available to them;
- to widen the range of high-quality education offerings in mathematics, science, and technology at all levels, so that more students will be well prepared for (and thus have greater options to choose among) technically oriented careers in management and the professions; and
- to deepen the general understanding of mathematics, technology, and science by present and future citizens for life, work, and full participation in a technological society.

The Foundation will consider proposals for support of educational activities in any field of science, including but not necessarily limited to: astronomy, atmospheric sciences, biological sciences, behavioral sciences, chemistry, computer sciences, earth sciences, engineering, information science, mathematical sciences, materials science, oceanography, physics, and the social sciences. Interdisciplinary and multidisciplinary proposals also are eligible for consideration.

Because education is the responsibility of many institutions, the Foundation seeks to play a catalytic role that will enhance local efforts, bring to bear the skills and knowledge of the Nation's best scientists and educators, and engage the resources of both the public and private sectors. The Directorate for Science and Engineering Education defines and funds programs and projects that support this educational mission.

DIRECTORATE
for
SCIENCE AND ENGINEERING EDUCATION

The Directorate for Science and Engineering Education [SEE] has four major long-range goals:

- To help ensure that a high quality primary and secondary education in science and mathematics is available to every child in the United States.

  This background should provide a base for understanding by all citizens and be sufficient to enable those with the interest and talent to pursue technical careers, especially in science, mathematics, and engineering.

- To help ensure that those who select careers in science, mathematics and engineering have available the best possible professional education in their disciplines.

  SEE will concentrate its efforts on the educational structure - on the teachers, students, materials, and instructional equipment that are of critical importance through the entirety of education, formal and informal, precollege, collegiate and graduate.

SEE will contribute to the research dimension of the professional education of scientists, mathematicians, and engineers, by emphasizing fellowship programs to identify the students of highest achievement and potential and support them in graduate study.

- To help ensure that opportunities are available at the college level for interested nonspecialists to broaden their science backgrounds.

  The great majority of students do not pursue technical careers and need a different kind of technical perspective to give them insights into, and knowledge of, the principles, practices, and limitations of science.

- To support science education outside the classroom, in order to encourage and maintain public interest in, and awareness of, scientific and technological developments.

The organizational structure adopted by the Directorate to address these goals through a variety of programs comprises three divisions and two offices: the Division of Teacher Preparation and Enhancement; the Office of College Science Instrumentation; the Division of Materials Development, Research and Informal Science Education; the Office of Studies and Program Assessment; and the Division of Research Career Development.

NSF EDUCATION PROJECTS: GENERAL CONSIDERATIONS

The Foundation has unique familiarity and a special relationship with the science, mathematics, and engineering research and education communities in the Nation's laboratories, colleges, and universities, and is especially interested in fostering the involvement of members of those communities in the design and implementation of innovative education projects.

The NSF encourages partnerships in the projects it supports, including cooperative involvements among colleges and universities, local and state education agencies, cultural and professional institutions and societies, and business and industry. Such partnerships should be based on mutual interests and purposes, with all partners sharing not only in financing, but in the development, implementation, and followup activities growing out of the collaboration.

The Foundation seeks leveraged application of its resources and is strongly committed to the principle of cost sharing in its projects, both as evidence of importance to the proposing institution, and as an indication of continuing commitment and long-term impact. Cost sharing by collaborating partners is required in some programs and strongly encouraged in all others -- especially when its goals include continuation and maintenance of project activities by local institutions or self-sustaining networks after NSF funding terminates. Since it takes substantial time to develop meaningful collaboration, projects that have small initial contribution from such partnerships, but present a well-developed plan to organize them and phase out the NSF share of project costs, are encouraged also.

The National Science Foundation is strongly concerned about the underrepresentation of women, minorities and the physically handicapped in careers in mathematics, engineering, and the sciences. Projects involving members of these groups as principal investigators or staff, or as the target audience, are especially encouraged. NSF is particularly interested in projects designed to test new approaches to increasing the numbers of students in such groups who are motivated to prepare themselves for careers in mathematics, science and engineering.

TABLE I

Expenditure by Unit for Fiscal Year 1983 - 87
Directorate for Science and Engineering Education

	1983	1984	1985	1986	1987 Planned
Materials Development, Research and Informal Science Education.....	$160,000	18,421,533	22,719,126	23,384,000	29,500,000
Teacher Preparation and Enhancement.......	$1,044,750	13,873,457	25,159,328	26,256,302	30,500,000
Studies and Program Assessment............	--	1,809,084	1,761,161	1,762,000	2,200,000
College Science Instrumentation.......	--	--	4,996,379	4,947,000	9,500,000
Research Career Development...........	$14,978,167	20,321,833	27,297,922	25,938,000	27,300,000
Total	$16,182,917	54,425,907	81,933,916	82,237,302	99,000,000

TABLE II

Directorate for Science and Engineering Education

Appropriations by Program Type and Fiscal Year

(Dollars in Millions)

	1983	1984	1985	1986	1987
Graduate Fellowships...	15.0	20.3	27.3	26.1	27.3
College Science Instrumentation......	--	--	5.0	5.3	9.5
Secondary and Elementary Science and Mathematics Education............	15.0[a]	54.7[b]	49.7	53.2[c]	62.2
Total................	30.0	75.0	82.0	84.6	99.0

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a) 13.9 carried over to fiscal year 1984
b) 31.5 carried over to fiscal year 1985
c) 31.5 deferred from fiscal year 1985
plus 21.7 new obligational authority

TABLE III

Directorate for Science and Engineering Education

Activity by Unit, 1983

	Proposals Received	No. of Awards	Amount Requested[a]	Amt. of Awards[a]
Materials Development, Research and Informal Science Education.......	109	3	$ 63,546	$160
Teacher Preparation and Enhancement.........	162	107[b]	$ 12,983	$1,044
Studies and Program Assessment.............	--	--	--	--
College Science Instrumentation.........	--	--	--	--
Research Career Development............	3,830	1,390	N/A	$14,978

---

a) In thousands of dollars.
b) Includes 104 Presidential Awards for Excellence in Science and Mathematics Teaching.

TABLE IV

Directorate for Science and Engineering Education

Activity by Unit, 1984

	Proposals Received	No. of Awards	Amount Requested[a]	Amt. of Awards[a]
Materials Development, Research and Informal Science Education.......	274	45	$103,939	$18,421
Teacher Preparation and Enhancement.........	597	214[b]	$145,891	$13,873
Studies and Program Assessment.............	29	15	$ 5,489	$ 1,809
College Science Instrumentation.........	--	--	--	--
Research Career Development............	4,449	1,510	N/A	$20,322

---

a) In thousands of dollars.
b) Includes 104 Presidential Awards for Excellence in Science and Mathematics Teaching.

TABLE V

Directorate for Science and Engineering Education

Activity by Unit, 1985

	Proposals Received	No. of Awards	Amount Requested[a]	Amt. of Awards[a]
Materials Development, Research and Informal Science Education.......	486	95	$126,888	$22,091
Teacher Preparation and Enhancement.........	623	264[b]	$267,765	$25,015
Studies and Program Assessment.............	24	13	$ 5,864	$ 1,748
College Science Instrumentation.........	1,348	234	$ 37,566	$ 4,836
Research Career Development............	5,002	1,560	N/A	$27,298

---

a) In thousands of dollars.
b) Includes 104 Presidential Awards for Excellence in Science and Mathematics Teaching.

TABLE VI

Directorate for Science and Engineering Education

Activity by Unit, 1986

	Proposals Received	No. of Awards	Amount Requested[a]	Amt. of Awards[a]
Materials Development, Research and Informal Science Education.......	346	111	$284,058	$23,384
Teacher Preparation and Enhancement.........	668	262[b]	$361,103	$26,256
Studies and Program Assessment.............	24	12	$ 5,456	$ 1,762
College Science Instrumentation.........	924	211	$ 23,384	$ 4,947
Research Career Development............	5,554	1,637	N/A	$25,938

---

a) In thousands of dollars.
b) Includes 104 Presidential Awards for Excellence in Science and Mathematics Teaching.

CHART I

Current Organization of the Directorate for SEE

- Division of Materials Development.Research and Informal Science Education
  - Applications of Advanced Technologies
  - Informal Science Education
  - Instructional Materials Development
  - Research in Teaching and Learning

- Division of Teacher Preparation and Enhancement
  - Science and Mathematics Education Networks
  - Teacher Enhancement
  - Presidential Awards for Excellence in Science and Mathematics Teaching
  - Teacher Preparation

- Office of Studies and Program Assessment

- Office of College Science Instrumentation

- Division of Research Career Development
  - Graduate Fellowships
  - Minority Graduate Fellowships
  - Advanced Study Institute Travel Grants
  - NATO Postdoctoral Fellowships
  - Presidential Young Investigator Awards

DIVISION OF MATERIALS DEVELOPMENT, RESEARCH AND INFORMAL SCIENCE EDUCATION

A broad understanding of science and technology on the part of American citizenry is essential to the strength of our scientific enterprise and to the security and economic vitality of our Nation. This understanding can be achieved only if all students are provided with a firm grounding in science and mathematics, and the precollege years are particularly critical to establishing a solid base in these areas.

Thus, there is a pressing need for excellent programs and well-prepared instructors to serve the needs of all students. The importance of this area was the principal recommendation of the National Science Board Commission on Precollege Education:

> "The 'basics' of the 21st century are not only reading, writing and arithmetic. They include communication and higher problem-solving skills, and scientific and technological literacy -- the thinking tools that allow us to understand the technological world around us.
>
> "These new basics are needed by all students -- not only tomorrow's scientists -- not only the talented and fortunate-- not only the few for whom excellence is a social and economic tradition. All students need a firm grounding in mathematics, science and technology."

The Foundation has established several programs for development and research in science and mathematics education. Support is provided for projects relevant to all precollege levels, and there is particular emphasis on efforts that can strengthen the quality and coherence of science and mathematics education during the critical early years when concepts, attitudes and aptitudes are being shaped for life.

The Foundation's programs in materials development and research are intended to provide curriculum support that will strengthen the quantity and quality of education for all children -- both those who will go on to become professional scientists, mathematicians and engineers, and those who will not. We seek to stimulate early learning that will establish a foundation of general concepts, prepare students for careers in science and technology, and develop the skills that are needed to contemplate realistically such a potential career.

At the same time, we seek a learning environment that will establish a basic science literacy for the general student, both those who will enter college and those who will not. To meet these varied goals, this Division supports a combination of research and development:

- development of materials and programs that help to motivate, instruct and develop the mathematics and science skills and insights of young people, both in-school and out;
- research on the processes of teaching and learning;
- research to generate knowledge and understanding essential to effective educational development; and
- research to explore the potential of new and improved technology for teaching and learning.

The attainment of these objectives is dependent on the widest possible involvement of active and productive scientists and science educators. For this reason, NSF makes every effort to:

- cultivate the support and participation of the science, mathematics, and engineering research and education communities; and
- involve scientists and science educators, teachers and administrators,

publishers and distributors, officials of state and local educational agencies, and the private sector in joint efforts whenever possible.

INSTRUCTIONAL MATERIALS DEVELOPMENT PROGRAM

This program supports the development of new or improved instructional materials and strategies for precollege science, mathematics and technology education. The program encourages the development of materials that fill gaps in content or curricula, present significant new approaches to the study of traditional subjects, introduce recent discoveries, or demonstrate applications of scientific and mathematical concepts.

The program particularly seeks materials that encourage the study and pursuit of science skills by all students - so that they are encouraged to acquire technological literacy, and so that the option of pursuing a technical career remains open to them as long as possible. This concern for critical skills and understanding is especially important in addressing the unrealized potential of women, minorities and the handicapped.

An important goal is to involve the most capable scientists and science educators in the Nation in the process of upgrading the quality of the science and mathematics materials used in precollege classrooms.

RESEARCH IN TEACHING AND LEARNING PROGRAM

The Report of the National Science Board Commission on Precollege Education in Mathematics, Science, and Technology emphasized that "early and substantial exposure to mathematical and scientific concepts and processes is critical to later achievement" and "essential to truly equal opportunity and continuing study in these fields." The report further urged that this be made a high priority for all the Nation's youth. If the Nation is to achieve these goals, we need to know what have been, and what are, the barriers to effective teaching and learning. We need to investigate and understand these barriers at the individual, family, institutional, and societal levels. We need to use this knowledge in the design of more effective educational programs. The Research in Teaching and Learning Program is one instrument for creating the knowledge that will assist in this process.

The Research in Teaching and Learning Program provides support for projects designed to acquire such knowledge, with emphasis on the classroom as an action site, both for its own sake and because of its usefulness to the varied education activities supported by other programs of the Foundation -- e.g., Instructional Materials Development, (student) Research Experiences, Applications of Advanced Technologies, Teacher Preparation and Enhancement, and Informal Science Education.

The program supports basic and applied research on the most significant factors that underlie effective teaching and learning at all levels. These include improved knowledge of how interest and motivation develop in science and mathematics, of how teachers learn the subjects they teach, of how students learn complex concepts in science and mathematics, of how they learn to apply these concepts effectively in real problem solving situations and in making personal decisions based on such concepts, and of the factors that are most influential in determining their participation and performance in science and mathematics courses. Such insights have important implications to the successful address of the high avoidance of these subjects by girls and minorities.

INFORMAL SCIENCE EDUCATION PROGRAM

This program provides support for projects that strengthen and enhance the scientific and technical understanding of the public outside of the formal education environment -- both young people and adults, and such target groups as women, minorities, and the handicapped. The program seeks to encourage a rich environment for recreational learning, where both children and adults can acquire a substantial measure of science literacy and awareness while satisfying a natural curiosity.

APPLICATIONS OF ADVANCED TECHNOLOGIES PROGRAM

This program supports research on the development and application of advanced educational technologies--particularly the computer--to science and mathematics education. Typical projects include exploration, development, and proof-of-concept demonstrations.

Projects may focus on technology as a tool, a medium, or an object of study. Among the anticipated products are innovative educational systems, authoring languages, problem solving tools, courseware, microworlds, tutors, and expert systems that increase the efficiency and effectiveness of instruction at all levels.

DIVISION OF TEACHER PREPARATION AND ENHANCEMENT

The National Science Board Commission on Precollege Education in Mathematics, Science, and Technology has stated that a primary national goal should be to strengthen elementary and secondary science and mathematics education to provide all the Nation's youth with a level of education that is both the highest quality attained anywhere in the world and reflects the particular and peculiar needs of our Nation.

Since most people acquire their basic science education in grades kindergarten through twelve, strong elementary and secondary education in mathematics, science, and technology is essential. For citizens who do not pursue postsecondary study, what is learned at the precollege levels is crucial. For students pursuing nontechnical careers as well as students preparing for careers as engineers, mathematicians, scientists, and science educators, college and university programs build upon and extend this early development.

In response to these needs, the Foundation is focusing especially on projects that will strengthen science and mathematics education for students at the middle/junior high school and elementary level. Both public and private school teachers are eligible to participate in NSF-supported projects.

Persons interested in seeking NSF support for new teacher education concepts will find Foundation staff members eager to share information about the successes and failures of past projects and features common to all highly rated proposals. Inexperienced project designers will also discover that teachers, chosen from the classrooms targeted for improvement by the project, can provide valuable advice and assistance.

Teachers are obviously central to education. They serve as models, motivators, and mentors--the catalysts of the learning process. Moreover, teachers are agents for developing, exchanging, and replicating effective teaching materials and methods. For these reasons, education in mathematics, science, and technology can be strengthened only if teachers are adequately prepared, highly motivated, and appropriately recognized and rewarded.

In attempting to achieve these goals, the Foundation has a dual strategy. It seeks to support well-designed projects that will directly benefit the teacher/participants by making them more competent in the subject matter, more comfortable in its presentation, and more committed to their profession and their pupils. Such anticipated outcomes are necessary for a successful project, but they are not sufficient. The Foundation expects that projects should add to the base of knowledge about how teachers can most effectively be prepared and subsequently aided to enhance their capabilities. A project that achieves the goal of aiding individual teachers (and, indirectly, their students) can also serve as an exemplar for other projects, thus broadly improving the quality of science and mathematics teaching.

The Division of Teacher Preparation and Enhancement supports projects that promote these objectives while adding to our knowledge about activities that prepare teachers in the content and the teaching methods that promote effective learning by students at each school level; enrich teachers' expertise for professional leadership and peer teaching; provide encouragement and opportunities for teachers to enhance and develop their capabilities; and provide dissemination opportunities that actively involve elementary, secondary, and college teachers in exchanging ideas that improve their own teaching.

In pursuit of this knowledge, the Division of Teacher Preparation and Enhancement encourages projects that:

- capitalize on the prestige associated with an NSF grant and exploit the Foundation's unique familiarity and relationship with the scientific research and education community;
- stimulate collaboration among such partners as the Federal government, colleges and universities, state and local education agencies, business and industry, cultural institutions and media, scientists and science educators, and teachers, school administrators, and parents;
- result in self-sustaining networks among these varied elements--cooperative patterns that will continue to function, supported by non-NSF funds; and,
- focus resources, exert high leverage, and are widely applicable approaches to strengthening science and mathematics education.

TEACHER PREPARATION PROGRAM

This program supports the development of innovative new programs for the preservice preparation of science and mathematics teachers, research on factors affecting the teacher preparation process, and the development of creative new materials to support teacher education. Thus, the program seeks to achieve the following goals:

- Stimulate a re-examination of the teacher preparation process.
- Catalyze the generation of models for the preservice preparation of science and mathematics teachers that could be replicated widely throughout the Nation.
- Broaden the knowledge base about the preparation of effective science and mathematics teachers.

Such activities will ultimately lead to:

- programs that will prepare teachers who are strong in content knowledge; pedagogical knowledge and skills, and the use of advanced technologies in instruction;
- innovative teacher preparation programs that integrate research on teaching and learning with content and pedagogical knowledge;
- linkages among scientists, science educators, education specialists, school personnel, and other participants in the teacher preparation process; and,
- the attraction of more individuals of high ability in science and mathematics to the teaching profession, particularly women at the secondary level and minorities and physically-handicapped at all levels.

TEACHER ENHANCEMENT PROGRAM

This program seeks to improve the quality of instruction in science and mathematics by supporting programs designed to enhance teacher effectiveness while serving as prototypes for other inservice projects. The specific objectives include the following:

- Stimulate the construction, investigation, documentation and refinement of effective approaches and creative materials for the continuing education of elementary, middle/junior high and high school mathematics and science teachers.

- Provide teacher participants with opportunities to learn disciplinary concepts and processes and effective teaching methods.

- Identify outstanding classroom teachers who will develop leadership skills to assist in improving the teaching practices of their less well-prepared colleagues.

- Identify less well-prepared classroom teachers with demonstrated needs and expressed commitments to pursue professional development with the goal of improving their competence for effective teaching.

- Support planned opportunities for teachers to share and work together in local and/or regional settings to improve their own teaching under the continued guidance of the project staff.

- Provide incentives to establish continuing collaborative partnerships among faculties of schools, colleges and universities, and personnel from a variety of public and private organizations.

- Help to attract the most talented individuals into education, giving special attention to increasing access to careers in science, mathematics, and technology for currently underrepresented populations.

SCIENCE AND MATHEMATICS EDUCATION NETWORKS PROGRAM

This program promotes the creation, evaluation, and exploitation of local, regional, or national networks designed to share information or disseminate resource materials relating to the teaching and learning of mathematics and science. Its goals are as follows:

- Stimulate the development, assessment and documentation of model approaches that demonstrate effective strategies for disseminating information and resource materials. Both the networks created and the materials disseminated should have significant impact on elementary and secondary science and mathematics education.

- Promote meaningful sharing of ideas, resources, and human talent through ongoing collaborations that may include, among others, teachers, parents, and other concerned persons from schools, local and state education agencies, colleges and universities, business and industry, and cultural and professional organizations.

- Build bridges between educational product developers and users, including teachers and local and state agencies responsible for selecting instructional materials. Such networks should help authors, publishers, and other producers of such materials to be more effective in meeting pedagogical needs.

- Encourage the development of resource-sharing activities of networks, possibly augmented by effective and appropriate use of video, computers, and telecommunications, that will serve the needs of local school districts and will continue after NSF support has terminated.

PRESIDENTIAL AWARDS FOR EXCELLENCE IN SCIENCE AND MATHEMATICS TEACHING

This is an initiative of the Office of the President of the United States to provide national recognition for distinguished middle and secondary school teachers of science and mathematics. Teachers eligible for this award are those whose primary responsibility is classroom teaching of science or mathematics in a public or private middle/junior or senior high school in each of the fifty states, District of Columbia, Puerto Rico, Department of Defense Dependents Schools, or the group of U.S. Territories (Guam, American Samoa, The Commonwealth of Northern Marianas, and the Virgin Islands). A minimum of five years teaching experience in science or mathematics is required.

Awardees receive national recognition and their schools each receive a two-year $5000 NSF grant to be used, under the direction of the awardee, for improving the science or mathematics instructional programs in their school districts. The involvement of these nationally recognized teachers in leadership activities to promote and improve science and mathematics education is encouraged.

OFFICE OF STUDIES AND PROGRAM ASSESSMENT

The goals of SEE's Office of Studies and Program Assessment (OSPA) are: to serve as a major source of research, policy data, and appraisal information for strengthening science, mathematics, and engineering education in the United States; and, to provide analytical and policy support for the leadership efforts of the Foundation in these critical areas. Much of the activity supported by OSPA serves to improve the National Science Foundation's own programs.

STUDIES AND ANALYSES PROGRAM

To support efforts to improve science, mathematics, and engineering education, data on many variables and their changes over time are needed. The National Science Foundation supports studies based on existing and new research data that provide a systematic understanding of national trends and needs, the effectiveness of educational alternatives, and other information that will assist the Foundation and other agencies in developing policy and action initiatives to strengthen science, engineering, and mathematics education in the United States. NSF's support of such studies is intended to stimulate a critical examination of the issues from the unique perspective of the sciences.

SEE recognizes that other NSF Directorates and other Federal agencies, including the Department of Education, have responsibility for collecting primary data on such topics as supply and demand for professional scientists, mathematicians, and engineers; supply and demand for faculty at various levels; and students' educational achievement and participation. In these areas, SEE's role is to collaborate with the other organizations in the collection and interpretation of primary data, or to support syntheses and secondary data analyses, rather than to perform its own primary data collection. In areas of special interest to science education, NSF sponsors enhancements (e.g., enlarged sample sizes, experiments in developing new testing procedures and analyses, and interpretation of data through ongoing studies) of new or continuing projects.

Proposals funded under this program are intended to: (1) provide data of national scope on significant problems and opportunities in science, mathematics, and engineering education, that would be useful for policy deliberations regarding the strengthening of such education in the United States; and (2) provide information that will assist in setting priorities and plans for the Foundation's science education programs. Proposals are invited for new data collection as well as for synthesis or secondary analysis of existing information.

In all cases, the proposals should describe explicitly how the proposed study builds on current knowledge in the field and how the results might be used in policy formulation and program planning for the National Science Foundation's education efforts and those of other agencies responsible for the improvement of science and engineering education.

Participation of scientists, mathematicians, and engineers grounded in the disciplines being studied is encouraged. Their contributions are essential because they provide not only subject matter expertise but insight into the issues germane to science education and in need of explication.

ASSESSMENT STUDIES PROGRAM

The Directorate for Science and Engineering Education (SEE) is beginning a systematic set of studies to gauge, on an ongoing basis, the quality and impact of the National Science Foundation's educational activities. The purpose is to assist NSF in its continuing efforts to enhance the effectiveness of its work. Findings of the studies also will inform outside audiences about implementation of the Foundation's programs.

Because of the importance of content to science, mathematics, and engineering education, and the special ways in which "knowing" evolves in these fields, there must be both (a) appropriate participation by scientists, mathematicians, and engineers, and (b) collaboration with evaluation specialists in the design and execution of assessment studies proposed to the Foundation.

SEE pursues its mission through a number of broadly-defined programs, each of which supports individual and sometimes numerous projects. Accordingly, the planning and related assessment activities of SEE take place on two different but interrelated levels:

o At the program level, the yardsticks relate to the Directorate's mission and basic goals; assessment provides information on the contributions and potential of various programs, so that current and alternative ones can be compared.

o At the project level, attention focuses on program goals and the aggregate impact of current projects. Appraisal provides information about the effectiveness of individual projects; identifies strengths that should be propagated and weaknesses to be avoided in the selection of future projects; and in other ways informs program officers as they adjust the project mix to achieve the goals of each program.

OFFICE OF COLLEGE SCIENCE INSTRUMENTATION

Colleges in the United States make a vital contribution to the preparation of the Nation's future scientists and engineers, teachers, and leaders in business and government. The purpose of the College Science Instrumentation Program (CSIP) is to support excellence in science and engineering instruction at these institutions. Students in science and engineering courses - majors and non-majors alike - must have experience with suitable, up-to-date equipment to become involved in the work that is at the heart of scientific understanding and progress. Through the College Science Instrumentation Program, the National Science Foundation provides matching support for purchase of instructional equipment to be used to implement new or improved undergraduate programs in the sciences and engineering.

The specific objectives are to encourage and support:

o Introduction of modern instruments to improve the experiences of undergraduate students in science and engineering courses, laboratories, and field work;

o Interfacing of computers with scientific instrumentation and other appropriate uses of current technology in science and engineering instruction;

o Development of new instrumentation and new ways of using instrumentation to extend instructional capabilities; and

- Establishment of equipment-sharing capability via consortia or centers.

The strategy underlying the highly competitive nature of the College Science Instrumentation Program is to produce projects that:

- Set standards for instrumentation and its use against which other institutions measure themselves and for which they strive to achieve.

- Yield products such as laboratory manuals and scholarly publications, serving a common good as well as fostering local improvement.

The program supports well-focused projects that will result in a clear improvement in the quality of undergraduate education. This may be done by providing for:

- Acquisition of new, state-of-the-art instructional scientific equipment;

- Upgrading of existing equipment; or

- Replacement of non-functional or clearly obsolete equipment with apparatus that extends instructional capabilities.

Because the objective of the program is to improve the quality of instruction, projects based primarily on financial need or increased enrollments are not appropriate. Projects are expected to involve activities which go beyond the basic level of support from the institution necessary to ensure a viable program.

CSIP accepts proposals that request funds for instructional scientific equipment. A maximum of $50,000 may be requested from NSF; grantee institutions must provide an equal or greater matching contribution. The minimum grant request to NSF for CSIP funds is $5,000. Grants in support of CSIP activities are normally made for a 2-year period. It is expected that the requested equipment will be acquired during this time.

Presentation of the results of successful projects at a professional meeting or in an appropriate journal is encouraged in order that other institutions also may benefit from CSIP projects.

Research Career Development

A continuous flow of many of the Nation's brightest young people into careers in science and engineering is of immense national importance, and the critical Federal role in ensuring this flow has nearly universal support. Assurance of a ready pool of highly qualified scientists and engineers is crucial in a nation whose security and economic well-being depend on science and technology.

Because of this, for 35 years the National Science Foundation has, in a variety of ways, led in developing and broadening the pool of students who enter advanced study for careers in science and engineering. The strategic plan for the NSF Directorate for Science and Engineering Education focuses on three target groups:

1. Beginning graduate students,

2. Young postdoctoral students seeking international study and research experience, and

3. Junior faculty in areas of critical personnel shortage in industry and academia.

(The latter two activities are managed by Directorate for Science and Engineering Education staff, but are funded from sources external to the Directorate.)

1. Beginning Graduate Students. The Directorate supports graduate level training and education primarily through awarding fellowships.

- Since 1952 the Foundation has awarded Graduate Research Fellowships annually to a group of the Nation's most talented graduate students in science and engineering. These three-year awards provide recognition and support for the Fellows, and are insurance for the Nation that talented scientists and engineers in a wide variety of fields will be available to address the problems at the research frontiers of the future. Persons awarded Graduate Research Fellowships are permitted to undertake their tenures at the graduate institutions of their choice.

- The awards carry stipends for the Fellows and allowances for their institutions in lieu of all required tuition and fees. Since FY 1985 the stipend level has been $11,100 annually ($925 per month) and the institutional allowance has been $6,000 per year.
- The number of new awards made each year was raised from 500 to 600 in FY 1984, remained at 600 in FY 1985, and dropped to 560 in FY 1986 and for FY 1987. The decrease in number of initial year awards was occasioned by level funding of the program, at $27.3 million annually, for the fiscal years 1985-1987.

Since FY 1978 this activity has operated with two component programs: Graduate Fellowships and Minority Graduate Fellowships. The latter program receives 10% of activity resources, and is identical to Graduate Fellowships except that application is limited to members of ethnic minority groups underrepresented at the advanced levels of science and engineering.

2. International Postdoctoral Study. The Directorate for Science and Engineering Education, on behalf of the Foundation and at the request of the Department of State, manages the United States component of the NATO Postdoctoral Fellowships in Science Program.

- Since 1959 each NATO member country has received an allocation from NATO to be used by its own nationals in international study and research. The objective is to promote scientific understanding and cooperation among member countries. The U.S. allocation is used to support fellowships at the postdoctoral level for scientists and engineers within five years of their Ph.D.'s. Fellows must study outside the United States in a NATO or closely allied nation.
- NATO Postdoctoral Fellows receive a stipend of $19,200 per year with small additional allowances for dependents, travel, and institutional costs. Current funding permits offers of about 50 awards per year.

3. Junior Faculty Awards. The National Science Foundation assists universities to improve their capability to respond to the demand for highly qualified scientific and engineering personnel for academic and industrial research through the Presidential Young Investigator Awards Program.

- The program was initiated in 1984 by the National administration. It is funded within the Foundation by the several research directorates and is coordinated by staff of the Directorate for Science and Engineering Education.
- The activity focuses on the Nation's most promising young faculty and potential faculty, and seeks to put in place the highest quality faculty members for educating the next generation of professional scientists and engineers.
- Presidential Young Investigator Awards carry a base annual grant of $25,000, which can be augmented by the NSF up to an additional $37,500 on a dollar-for-dollar matching basis with contributions from industrial sources. Awards are renewable up to a total of five years. In addition to Federal and industrial contributions, the awardees' institutions share by providing their academic year salaries.
- The awards are made on the basis of a national competition among individuals nominated by Ph.D.-granting institutions. Two hundred first year awards were made in FY 1984 and FY 1985, and 100 in FY 1986. The Foundation plans to make 200 new awards in FY 1987 and annually thereafter.

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Presidential Awards for Excellence in Science and Mathematics Teaching

Nancy V. Bell
Science
Pelham High School
Pelham, AL 35124

Martha B. Howell
Mathematics
Central High School
Tuscaloosa, AL 35401

Fellowships

Auburn University Auburn, AL 36849 Graduate Research Fellowships Support Grants	$49,050

Whitman Cross, II
Red Mountain Museum
Birmingham, AL 35205

TPE-8550575
$49,560
Physical
12 months

"Museum-Centered In-Service Physical Science"

The Red Mountain Museum of Birmingham Alabama will offer an academic-year, in-service, instructional program for teachers of 9th grade physical science. The Museum will be the site of this project and will simulate the classroom and the type of laboratory facilities found in the schools. The program is intended to reduce the anxiety of the teacher, raise self-confidence, and improve laboratory skills, subject matter competence, and mathematical skills.

The Education Department of Red Mountain Museum, all certified teachers, have designed this project based on a teacher survey so that participants will meet once a week for two-and one-half hours during the academic year. The time will be split between lecture and hands-on activities that will directly prepare the teachers for the activities prescribed by the new syllabus for physical science.

An excellent evaluation component of the project provides for the observation of each participating teacher at least four times during the school year. Evaluative instruments will assess the laboratory work of the teachers and of their students as well as their attitudes toward science.

Sidney H. Young
Department of Chemistry
University of South Alabama
Mobile, AL 36688

CSI-8651062
$9,880
Chemistry
30 months

"Electron Spin Resonance Spectroscopy in the Undergraduate Curriculum"

This project will introduce electron spin resonance (ESR) spectroscopy into the undergraduate chemistry curriculum at the University of South Alabama. ESR is a spectroscopic tool used for research in many different areas of chemistry, ranging from chemical synthesis to the study of magnetic properties of molecules. The instrument will be used in three phases of the laboratory curriculum. In physical chemistry, the type of information obtainable by ESR will be studied using organic radicals as examples. In instrumental analysis, the characteristics of the spectrometer will be studied. The ESR system will also be used to demonstrate the technique of computer interfacing, since the instrument can be driven by computer and the resulting output can be recorded and analyzed by computer. Additionally, the instrument will be used in undergraduate chemistry research projects involving the effects of various ligands on the magnetic properties of transition metal complexes.

Francis M. Donovan, Jr.	CSI-8650383
Department of Mechanical Engineering	$26,420
University of South Alabama	Engineering
Mobile, AL 26688	30 months

"Instrumentation for Undergraduate Laboratory Instruction in Engineering"

Seven multi-use digital/measurement and control system stations are now in place through the recent acquisition of major system components including computers, analog/digital and digital/analog boards, 20 amplifier boards, oscilloscopes, printers and strip chart recorders. These stations are the main instrumentation teaching tools in the sophomore mechanical engineering instrumentation course, and are central to student instrumentation work in junior and senior mechanical engineering laboratories and in a senior controls course. A versatile tool is available for undergraduate students to gain experience with the intricacies of data collection, analysis and reporting. With the improved undergraduate laboratory curriculum, students are exposed to a wider variety of such experiences than was previously possible.

ALASKA

Presidential Awards for Excellence in Science and Mathematics Teaching

Warren B. Van Camp
Science
Bethel Regional High School
Bethel, AK 99559

Robert M. Packard
Mathematics
Ketchikan High School
Ketchikan, AK 99901

Fellowships

University of Alaska - Anchorage Anchorage, AS 99508 Graduate Research Fellowships Support Grants	$16,350

AMERICAN SAMOA

Presidential Award for Excellence in Science and Mathematics Teaching

Joseph Stanislaus
Science
Samoana High School
Pago Pago , Samoa 96799

ARIZONA

Presidential Awards for Excellence in Science and Mathematics Teaching

Bernice L. Lenz
Mathematics
Magee Middle School
Tucson, AZ 85710

Malcolm H. Wells
Science
Marcos de Niza High School
Tempe, AZ 85283

Fellowships

Arizona State University Tempe, AZ 85287 Graduate Research Fellowships Support Grants	$44,970
Individual Awards for Foreign Tenure Graduate Research Fellowship	$17,100
University of Arizona Tucson, AZ 85721 Graduate Research Fellowships Support Grants	$125,730

Frederick A. Staley	TPE-8651468
Arizona State University	$154,018
Tempe, Arizona 85287	12 months

"A School-Industry-Community Approach to the Development of Scientific and Technological Literacy Among Elementary School Pupils"

This project is designed to implement and sustain a scientific-and technological-literacy-for-all-students approach in elementary schools in Arizona. An action plan will be developed by each school community and will include the following features: a) designation of the school principal as the facilitator of school community change, b) selection of a science instructional leader who will receive special preparation in a science, technology, society, and science education academy, c) design of vehicles for the sharing of up-to-date science and technology information by the science instructional leader with other teachers and children, d) development of interdisciplinary, instructional thematic units which provide up-to-date technology learning experiences to supplement the existing science and social studies programs, and e) involvement of community businesses, industries, informal education agencies and key parents.

A variety of useful products and outcomes will be developed including:

a) A Science, Technology, Society Curriculum Data Bank which will enable sharing of such resources as: thematic units developed by teachers; newsletters on science and technology; reviews of relevant videocassettes; reviews of relevant television programs; reviews and suggested use of locally available curriculum materials; information about community resources, computer software programs, pamphlets, brochures, and films.

b) A report about effective strategies and approaches for creating thematic units that utilize local resources, deal with societal issues, and have local and community relevance and practicality for students.

c) Suggestions about effective strategies and techniques for implementing thematic units with children in classrooms.

d) Descriptive, longitudinal and comparative research data about the process and effects of attempting to bring about substantial change in the science curriculum utilizing two different sequences of teacher preparation and implementation.

Anton E. Lawson	TPE-8550473
Arizona State University	$170,491
Tempe, AZ 85287	Biology
	36 months

"Biology Teacher Training Using the Learning Cycle"

This three-year project provides high school biology teachers in the Phoenix area with the training necessary to teach the inquiry-oriented Learning Cycle method of instruction.

The project consists of the following steps:

Year One:	The materials developed under a former grant will be used and refined by the biology faculty at Dobson High in Phoenix.
Year Two:	Faculty will be trained and the program will be expanded to include five additional high schools.
Year Three:	The faculty previously trained in the Learning Cycle will offer in-service courses for other biology teachers in the immediate area.

ARKANSAS

Presidential Awards for Excellence in Science and Mathematics Teaching

Alice J. Gadberry
Mathematics
NLR Northeast High School
North Little Rock, AR 72116

Bonnie Moody
Science
Ridgeroad Junior High School
North Little Rock, AR 72116

Thomas A. Nelson	CSI-8650703
Biology Department	$7,200
Arkansas Tech University	Biology
Russellville, AR 72801	30 months

"Interfacing a Microcomputer and Telemetry Equipment for Undergraduate Field Studies in Animal Ecology and Ethology"

With computer-automated telemonitoring equipment provided through this grant, the Wildlife Biology faculty of the Arkansas Tech University has created a facility for recording and analyzing the activities of radio-equipped animals at a 200-acre outdoor laboratory adjacent to the campus. The facility will provide students in ecology, animal behavior, and fisheries and wildlife management courses an opportunity to study daily and seasonal activity patterns, movements, habitat use, territoriality, dispersion, and social organization of the animals inhabiting this area. Instruments to be purchased for the facility include an integrated radio-telemetry system for the transmission and reception of each animal's location and activity, and an interfaced microcomputer for data storage and analysis. Use of the telemetry-computer system, in concert with traditional methods of wildlife observation, will provide a unique opportunity to supplement classroom learning with a dynamic, problem-oriented learning experience in the field.

In addition to use in regular undergraduate courses, the facility will serve the needs of local high school biology teachers enrolled in in-service workshops, of upper-division students enrolled in individual directed-research projects, and of local area high school students participating in ATU's "gifted and talented" science program. This relatively low-cost effort promises to have an enormous impact upon the teaching of animal ecology and ethology in this institution, and to have a valuable spillover benefit for biology programs in the local high schools.

Lester C. Howick	TPE-8554441
University of Arkansas	$43,231
Fayetteville, AR 72701	Chemistry
	12 months

"AP Chemistry Workshop"

The University of Arkansas is providing an opportunity for 15 high school chemistry teachers from the state of Arkansas to upgrade their background in content and methodology. This program is specifically designed to prepare these experienced chemistry teachers for the teaching of Advanced Placement (AP) Chemistry.

Activities will include lectures on topics appropriate to this level of chemistry, laboratory experiments which will include those experiments on the AP list, seminars on current research being conducted on the campus, discussions with campus researchers, and visits and observations of classroom activities by the project staff.

Thomas J. Lynch	CSI-8650756
Department of Biology	$47,890
U of Arkansas at Little Rock	Biology
Little Rock, AR 72204	30 months

"Modernization of Undergraduate Laboratories in Cell Biology and Biological Instrumentation/Methods"

The goal of this project is to update The University of Arkansas-Little Rock's Cellular Biology course, to initiate a Biological Methods and Instrumentation course, and to improve undergraduate student research. The instrumentation being purchased through this award includes a liquid scintillation counter, two high speed centrifugation units, an ultraviolet visible light spectrophotometer, three visible light spectrophotometers, two pH meters, a tissue microcentrifuge, fraction collectors with peristaltic pumps, one refrigerated chromatography chamber, two water baths and four microprocessor units. This equipment is providing students with a more thorough understanding of cellular and sub-cellular biology.

Ali U. Shaikh	CSI-8651006
Department of Chemistry	$9,500
University of Arkansas-Little Rock	Chemistry
Little Rock, AR 72204	30 months

"A Versatile Electrochemical Analyzer for Instruction in Instrumental Analysis"

The goal of this project is to improve students' laboratory experience in electrochemistry at the University of Arkansas-Little Rock. Students enrolled in the instrumental analysis course and those pursuing research projects will use a versatile computer-controlled electrochemical analyzer, an instrument capable of performing most of the major electroanalytical techniques by software commands. The instrument will be used to design and carry out several laboratory course experiments as well as student research projects. With this equipment, students will gain thorough knowledge of the fundamentals and analytical applications of electrochemistry.

CALIFORNIA

Presidential Awards for Excellence in Science and Mathematics Teaching

Jennifer W. Harris
Science
Ukiah High School
Ukiah, CA 95482

Sanderson M. Smith
Mathematics
Cate School
Carpinteria, CA 93013

CALIFORNIA

Fellowships

California Institute of Technology Pasadena, CA 91125 Graduate Research Fellowships Support Grants	$833,630
California State University - Long Beach Long Beach, CA 90840 Minority Graduate Research Fellowships Support Grants	$16,350
Claremont Graduate School Claremont, CA 91711 Minority Graduate Research Fellowships Support Grants	$16,350
Individual Awards for Foreign Tenure Graduate Research Fellowships	$36,975
Stanford University Stanford, CA 94305 Graduate Research Fellowships Support Grants	$2,207,370
University of California - Berkeley Berkeley, CA 94720 Graduate Research Fellowships Support Grants	$2,247,170
University of California - Davis Davis, CA 95616 Graduate Research Fellowships Support Grants	$149,280
University of California - Irvine Irvine, CA 92717 Graduate Research Fellowships Support Grants	$30,680
University of California - Los Angeles Los Angeles, CA 90024 Graduate Research Fellowships Support Grants	$181,700
University of California - Riverside Riverside, CA 92521 Graduate Research Fellowships Support Grants	$86,300
University of California - San Diego La Jolla, CA 92093 Graduate Research Fellowships Support Grants	$232,390
University of California - San Francisco San Francisco, CA 94143 Graduate Research Fellowships Support Grants	$264,950

CALIFORNIA

Fellowships

University of California - Santa Barbara Santa Barbara, CA 93106 Graduate Research Fellowships Support Grants	$123,860
Univeristy of California - Santa Cruz Santa Cruz, CA 95064 Graduate Research Fellowships Support Grants	$49,050
University of Southern California Los Angeles, CA 900891 Graduate Research Fellowships Support Grants	$65,400

Peter Rodda
California Academy of Sciences
Golden Gate Park
San Francisco, CA 94118

MDR-8550957
FY 86 $149,830
FY 87 $246,780

"Life Through Time--The Impact of Evolution"

The California Academy of Sciences, a major natural history institution located in San Francisco, will develop Life Through Time, a large permanent exhibition on evolution that will inform and challenge visitors as they "walk through" a series of exhibits which encourages them to touch and explore.

The exhibition will cover the history of life on earth, how scientists recognize and evaluate change through time, the scientific method and process of discovering, and the impact of evolution. A teacher's educational resource kit with hands-on materials will be developed for use in the schools along with teacher training courses.

The exhibition will reach a substantial audience, over a million and a half visitors per year. Additionally, 44% of the San Francisco elementary school children are visited each year by Academy docents, the mobile classroom reaches 7,000 Bay Area residents, over 5,000 children and adults take classes at the Academy and 10,000 school children visit the museum each year.

David L. Goodstein
California Institute of Technology
Pasadena, CA 91125

MDR-8642837
FY 86 $15,000
8 months

"Adapting the Mechanical Universe: Materials for High School Physics"

The Mechanical Universe was initially developed as an undergraduate physics course to be delivered via television and supported by printed materials. This project is adapting the course for use at the high school level. To date, twelve modules have been developed and field-tested. Four new modules are underway for piloting in Spring 1986: "Temperature and the Gas Laws", "Waves", "Kepler's Laws", and "Einstein to Black Holes". This supplement will permit the Council of twelve high school teachers to meet during the summer of 1986 to revise the latest modules based on information gained during the pilot tests.

Eugene Harrison/Ilan Chabay
California Museum Foundation
700 State Drive
Los Angeles, CA 90037

MDR-8651997
FY 86 $190,600
FY 87 $111,406

"Concepts of Chemistry: A Hands-On Exhibition"

The California Museum of Science and Industry will create a 3,000 square foot permanent exhibition of hands-on participatory exhibits on chemistry and chemical phenomena that will allow visitors to manipulate the variables of chemical systems. Forty exhibit units will be organized in clusters in that represent the basic concepts of properties of atoms and molecules, molecular structure and chemical reactions, stability of molecules and rates of reactions, forces between atoms and molecules and energy of atoms and molecules.

The exhibition will use state-of-the-art technology to present chemical experiments previously left to the lab bench or the demonstration table. Interactive computers and videodiscs will be used where danger or complexity prevents the visitor from using "the real thing." Exhibit content will be proved in prototype form and tested on museum staff, visitors, and school groups prior to final design and construction. NSF support will be used in the design and prototype phases, and an "exhibit cookbook" of exhibit technologies for use by other museums will be created.

The project has already attracted more than $175,000 of matching funds towards a total of $800,000 in non-NSF matching funds to support its $1,100,000 budget.

Jon A. Hoffmann	CSI-8650968
Department of Aeronautical Engineering	$14,025
Cal Poly State Univ-San Luis Obispo	Engineering
San Luis Obispo, CA 93407	30 months

"Sting Balance for a Wind Tunnel"

In this project, the Aeronautical Engineering Department at California Polytechnic State University, San Luis Obispo is using an Aerolab sting balance to utilize fully the capabilities of the Cal Poly wind tunnel. This system exhibits the basic principles of aerodynamic design and introduces the student to modern instrumentation and experimental techniques. Students conduct tests of realistic (3-dimensional) models, investigate pitching movement (nose up), study asymmetric characteristics, test devices without a two-dimensional counterpart, and investigate stability and control. The sting balance system is used in several required undergraduate courses of the Aeronautical Engineering Department, and significantly improves undergraduate instruction.

G. T. Murray	CSI-8650241
Department of Metallurgical Engineering	$21,565
Cal Poly State Univ-San Luis Obispo	Engineering
San Luis Obispo, CA 93407	30 months

"Induction Melting Facility"

The acquisition of a 20-KW induction melter coupled with a vacuum chamber and zone refining apparatus provides the capability to deal with high melting point metals such as iron, nickel, chromium, cobalt, zirconium and titanium. Undergraduate engineering students perform experiments on solidification, purification, gas-metal reactions and preparation of alloys for electrical and mechanical property determinations.

John E. Poling	TPE-8551000
California State University	$121,335
San Luis Obispo, CA 93407	Physical/Earth
	24 months

"Rural Elementary Teacher Development in Science"

California Polytechnic State University, San Luis Obispo, is offering a four-week summer workshop both in 1986 and in 1987 to provide in-depth instruction in physical and earth science concepts for 48 elementary school teachers from

24 schools. The instruction will include many hands-on experiential activities along with the opportunity for supervised practice of teaching strategies. Five follow-up visits will be made to the participants during the academic year following the summer workshop. Project staff from both university and school levels will make these on-site visits for the purpose of supporting the teachers.

The proposal is a result of an expressed need garnered through a grass roots network called Science Cooperative for Outstanding Public Education (SCOPE), a county-wide network of teachers, administrators, and others interested in improving science instruction in the schools.

Edward Cogger	CSI-8650978
Department of Animal Science	$36,820
Cal St Poly University-Pomona	Biology
Pomona, CA 91768	30 months

"Equipment to Support an Integrated Laboratory Approach to Teaching Animal Anatomy and Physiology to Undergraduates"

The aim of this project is to equip student work stations that provide supervised hands-on participation in laboratory exercises to replace the demonstration practices previously followed. Four Grass polygraph systems, ten microscopes, and an Apple IIe-based instrumental control and data collection system are being installed in the undergraduate Animal Anatomy and Physiology laboratories to potentiate a basic and far-reaching curricular change. Six laboratory courses are affected. Majors in Animal Science now will graduate from this program much better prepared to meet the demands of graduate school or employment in this rapidly growing aspect of applied biology. The project serves students of mainly urban origin and of diverse backgrounds, ethnicities and socio-economic levels. Approximately 70% of the students served are women.

Ray C. Shiflett	TPE-8550918
California State Polytechnic University	$135,598
Pomona, CA 91768	Mathematics
	24 months

"Marianas Islands Mathematics Institute"

This project will strengthen the mathematical background of teachers, grades K-12, of the Commonwealth Northern Marianas Islands (CNMI).

During the summer of 1986 there will be a 17-day workshop of problem-solving activities found in general mathematics and elementary algebra textbooks. In the summer of 1987 there will be a 17-day workshop on general strategies for treating a variety of problem-solving situations with participants constructing problem-solving programs for their classrooms.

The academic year following the summer workshop will have classroom visitations by the staff from the Department of Education in Saipan.

Richard Bednar	CSI-8650325
Department of Electrical Engineering	$45,000
California State University - Chico	Engineering
Chico, CA 95929	30 months

"Instrumentation for Communications and Signal Processing Laboratory"

California State University, Chico, will establish a communications and digital signal processing laboratory for undergraduate electrical engineering students. Major instruments to be purchased are two computer-based telephone branch exchanges, five microcomputers, three instruments for communication signal analysis (protocol analyzer, signal analyzer and high speed oscilloscope/digitizer), and four digital signal processing/analog interface boards. This equipment will be combined with existing basic laboratory instruments to provide a laboratory component for five undergraduate engineering courses. Digital communications and signal processing are rapidly growing technical areas; this project will provide students with the laboratory experience needed to prepare them for further study in graduate school or professional work in industry.

Glenn M. Nagel	CSI-8650728
Department of Chemistry	$38,615
California State University-Fullerton	Chemistry
Fullerton, CA 92634	30 months

"High Performance Liquid Chromatography in the Undergraduate Laboratory"

This project will enhance undergraduate chemistry education at California State University-Fullerton by incorporating computer-controlled gradient high performance liquid chromatography (HPLC) capability into a vigorous undergraduate research program and advanced laboratory courses. In Biochemistry Laboratory and Integrated Chemistry Laboratory, all chemistry and biochemistry majors will learn the theory and practice of HPLC as well as computer interfacing and data storage, reduction, analysis, and interpretation. Students will use a wide variety of columns, solvent systems, and detectors for many different HPLC applications. The hands-on laboratory experience provided by this instrumentation will prepare students for graduate and professional schools, and for careers in chemistry and biochemistry.

J. A. Ryan	CSI-8650321
Department of Earth Science	$9,968
California State University-Fullerton	Earth Sciences
Fullerton, CA 92634	30 months

"A Seismic Reflection/Refraction System in Undergraduate Geology Education"

Undergraduate laboratory instruction in geology is being enhanced through the development of a seismic system for the determination of subsurface structure. Students can now gain experience using seismic reflection and seismic refraction through the recent acquistion of an energy source allowing refraction measurements to a 200-meter depth and reflection measurements to a 2-kilometer depth. In addition, the storage, retrieval and analysis of seismic data in digital form is now being used to acquaint students with modern seismic data handling techniques.

David L. Pagni
Robert Y. Hamada
California State University at Fullerton
Department of Mathematics
800 N. State College Blvd.
Fullerton, CA 92634

MDR-8651616
FY 86 $461,497
FY 88 $351,044
24 months

"Calculators and Mathematics Project - Los Angeles (CAMP-LA)"

The electronic hand-held calculator is a tool that can be used as an integral part of the elementary school mathematics curriculum. With calculators so abundant and inexpensive, each child should be able to have a calculator for appropriate use in mathematics and in other subjects where mathematics can be applied. Although some materials are available that support the use of the calculator in the elementary school, there exists currently no coherent set of materials that looks at the curriculum in a new light, assuming that the calculator is an essential tool to be used in learning and doing mathematics.

This project will develop a model for change in the K-6 mathematics curriculum, based on the assumption that every child has a calculator. Anticipated changes include diminishing time spent on certain topics (such as long division) and increasing time spent on other topics (such as problem solving and reasoning). The project will develop a set of calculator-based student materials for Grades K-6 designed to be flexible enough to stand alone or be supplementary; a set of teacher materials that will include a guide for teaching mathematics using calculators and student evaluation materials with protocols for evaluating student work when engaged in activities such as problem solving; and materials on the use of calculators in an elementary setting, to be used in the preservice preparation of teachers.

The project will be a collaborative effort of the California State University at Fulleraton and the Los Angeles Unified School District. One of the goals of the project is to create a replicable model for university-school district cooperation in curriculum development and teacher education.

Donald L. Peterson
Department of Chemistry
California State University-Hayward
Hayward, CA 94542

CSI-8650502
$42,642
Chemistry
30 months

"Introduction of Computer-Controlled Gas Chromatograohy/Mass Spectrometry (GC/MS) into the Chemistry Curriculum"

The continuing prevalence of GC/MS instrumentation in industrial and academic research laboratories makes it increasingly important that baccalaureate chemists gain experience in this technique as an integral part of their undergraduate education. A primary objective of this project is to give undergraduate chemistry students at California State University-Hayward hands-on experience with GC/MS instrumentation and its capabilities for solving problems in chemical analysis, physical measurements, organic and inorganic synthesis, qualitative organic analysis, and undergraduate research projects. The instrument will also introduce students to computer control and spectral library searching. Additionally, the unit will augment training in other chemistry courses by providing GC/MS analysis for students of organic chemistry and illustrative spectra for introductory courses in chemistry.

Marvin R. Winzenread	CSI-8650853
Dept. of Mathematics & Computer Science	$35,672
California State University-Hayward	Comp Science
Hayward, CA 94542	30 months

"Computer Workstations for a VLSI Design Course"

The Department of Mathematics and Computer Science of California State University-Hayward will offer a course in Very Large Scale Integrated Circuit (VLSI) design. The course will start with single gates in NMOS and CMOS and continue through to the study of medium and large scale integrated computer components. To provide a laboratory for the course the Department will purchase three Sun 3/160C workstations and use software developed at Berkeley. The course will provide a solid foundation in VLSI design for advanced undergraduate majors, many of whom will work in industry.

Richard Kakigi	CSI-8650824
Department of Mathematics	$50,000
California State University-Hayward	Mathematics
Hayward, CA 94542	30 months

"Statistics Department Minicomputer Center"

The Statistics Department will establish a departmental computer center for use in all its statistics courses. The center will consist of a Prime 2255 minicomputer with software and peripherals, and 16 IBM PC microcomputers. The PC's will be connected to the minicomputer in order to provide access for computer-intensive calculations, and they will be used alone for calculations for which they are more suitable. The facility will enable the Department to tailor the system to statistics calculations and to conduct statistics laboratories. Both activities will allow students in statistics courses more appropriate access to computers and will allow them to use better analysis tools and larger data sets on which to perform analyses.

Gill G. Geesey	CSI-8650736
Department of Microbiology	$30,999
California State University-Long Beach	Biology
Long Beach, CA 90840	30 months

"Automated Liquid Chromatograph and Enzyme-Linked Immunosorbent Assay Instrumentation for an Undergraduate Microbiology Program"

High performance liquid chromatography (HPLC) and computer-linked enzyme-linked immunosorbent assays (ELISA) will be used by students in the Microbiology program at the University of California at Long Beach in preparation for laboratory technician positions in molecular biology, industrial, and environmental microbiology. HPLC will introduce students to time-efficient steps in the separation and detection of specific cellular components used in microbial identification. Applications of HPLC in microbiology will be presented in laboratory exercises in different upper-division elective courses offered by the Microbiology Department. ELISA instrumentation will introduce third-year students in the required course of Immunology and Serology to automated, time-efficient steps in the quantitation of specific proteins on the microbial cell surface using the specificity of antibody-dependent immunoassays. Students will become familiar with the application of computers to microbiological instrumentation and data analysis.

Experience with this equipment in the teaching laboratory exercises will prepare B.S. candidates in microbiology for positions in commercial laboratories where these techniques are currently in use. This new instrumentation will produce a major updating of this B.S.-level technician preparatory program.

Phoebe K. Dea	CSI-8650694
Department of Chemistry	$38,295
California State University - Los Angeles	Chemistry
Los Angeles, CA 90032	30 months

"Computer-Interfaced High Performance Liquid Chromatography and Differential Scanning Calorimetry in Undergraduate Analytical Chemistry Laboratories"

During the past fifteen years, there have been significant technological advances in analytical instrumentation. Laboratory experience is an integral and important component of undergraduate education in chemistry and biochemistry. This project will provide on-line computer-aided data acquisition and analysis capabilities necessary to equip students with skills required in real-world professional practice. It will outfit the undergraduate chemistry instrumentation laboratories at California State University-Los Angeles with equipment to carry out experiments in two additional areas: high performance liquid chromatography and thermal analysis. Both systems will be interfaced to a computer controlling the equipment and processing the data. The requested equipment will enable students to become familiar with techniques frequently encountered in modern research and industrial laboratories. Furthermore, they will gain both a broader perspective and a deeper appreciation of modern technologies, which will increase their enthusiasm for chemistry, and help them become better prepared chemistry graduates. With vigorous undergraduate research activities and honors programs, this department makes a noteworthy contribution to chemistry education of minority students.

Neda S. Fabris	CSI-8650693
Department of Mechanical Engineering	$7,565
California State University - Los Angeles	Engineering
Los Angeles, CA 90032	30 months

"Using a Computer Numerically Controlled Milling Machine in a Modern Manufacturing Laboratory"

The unmatched advancement in electronics and computer technology has made a huge impact on the machine tool industry in the last few years. In order to be prepared for future challenges in modern manufacturing, it is imperative that students in mechanical engineering and technology have direct experience with Computer Numerically Controlled (CNC) machining. The recent acquisition of CNC equipment (which supplements existing CAD/CAM capabilities) allows students access to a wider range of modern manufacturing laboratory activities through experiences with all phases of CAD/CAM design, from concept to final product. The number of students involved is substantially increased due to the capability of the CNC equipment to perform machining on one project while simultaneously being programmed for the next.

Rosemarie Marshall
Department of Microbiology
California State University - Los Angeles
Los Angeles, CA 90032

CSI-8650843
$11,000
Biology
30 months

"Improvement of the Undergraduate Microbiology Laboratory through the Addition of Chromatography Equipment"

The goal of this project is to improve the breadth and balance of educational experiences and to increase students' experimental proficiencies within a group of existing undergraduate Microbiology courses. The acquisition of temperature-programmable gas-liquid chromatographic equipment is faciliating the laboratory introduction of important concepts, principles, and procedures which previously could only be described in the lecture portion of these courses. The incorporation of educational experiences utilizing the newly acquired equipment is consistent with the Microbiology Department faculty's intent to introduce students to conventional analytical procedures in Microbiology, and to emphasize their value in the development of knowledge in these areas. The result should be graduates who are much better prepared for graduate studies or for employment in biotechnical positions.

Theodore J. Anagnoson
Department of Political Science
California State University-Los Angeles
Los Angeles, CA 90032

CSI-8650822
$24,435
Social Science
30 months

"A Microcomputer Facility for Teaching Social Science Research Methods and Statistics in Political Science"

This project establishes a facility to improve undergraduate education in political science. The system has the capability not only to hold the Political Science Department's extensive national survey and demographic data, but also to afford easy and simultaneous student access and use of the data in research methods and statistics courses in the department. Through the interactive use of the data base management system and the graphics capabilities of the statistical package, students gain experience in computerized data analysis.

Steven B. Oppenheimer
California State University
Northridge, CA 91330

TPE-8650081
FY 86 $121,057
FY 87 $123,000
FY 88 $125,000
FY 89 $ 24,000
Biology
12 months

"Advances in Biological Science"

This Leadership Activities Project will provide professional development for 120 outstanding junior and senior high school science teachers. The teachers will learn concepts and laboratory methods associated with contemporary research at the frontiers of biology, and they will prepare appropriate lesson plans and laboratory activities for secondary school students. The biologists making the presentations have been chosen on the basis of research skills and award-winning teaching. A feature of the program will be a keynote address and visit with Nobel Laureate Francis Crick, co-discoverer of DNA. The program staff also includes science educators from the local school district and from higher education.

This project will address topics at the frontiers of nutrition, marine biology, genetic engineering and recombinant DNA technology, human ecology, cancer biology, electron microscopy, cell biology, developmental biology, and computer applications in biological research. The laboratory program will stress methods and materials in modern cell biology.

Products of the project will include a book, video tapes, and laboratory activities that are both relevant and appropriate for secondary school students. It is anticipated that these products will be sponsored in part by local corporations or organizations. Another anticipated project outcome will be the initiation of courses or extracurricular activities in selected secondary schools that stimulate and support students conducting independent research projects.

John J. Vollmer
Department of Chemistry
Mills College
Oakland, CA 94613

CSI-8650701
$30,610
Chemistry
30 months

"NMR Spectrometer with Computer Interfacing for Undergraduate Chemistry Laboratories"

This project will make a significant contribution to the undergraduate chemistry program at Mills College by providing a 60-MHz NMR spectrometer with a variable-temperature accessory and sophisticated computer interfacing. Acquisition of this instrument is part of the on-going curriculum development in the department. The computer-interfaced NMR will be used by students in organic chemistry, instrumental analysis, biochemistry, physical chemistry, and undergraduate research. In addition, new experiments for undergraduate laboratories will be developed to investigate temperature-dependent phenomena and the application of NMR techniques to biochemical problems. This project will help Mills College continue to make a significant contribution to preparing women for careers in science.

Richard S. Hughes
Dept. of Physics & Computer Science
Pacific Union College
Angwin, CA 94508

CSI-8650983
$48,298
Engineering
30 months

"Lasers for a Program in Laser Technology"

Pacific Union College will provide students in the Laser Technology program experience with state-of-the-art laser instrumentation and techniques. The project provides carbon dioxide and Nd:YAG lasers and associated measurement instruments including power meters, spectrum and signal analyzers, and a fast oscilloscope.

The instrumentation will be incorporated into the laser laboratory activities and will expand and enhance the instructional and laboratory experience essential for students in a new program in laser physics. The equipment will help prepare students for a wide range of pursuits in the fields of lasers and electro-optics.

Paulette Bierzychudek Department of Biology Pomona College Claremont, CA 91711	CSI-8650774 $23,106 Biology 30 months

"Environmentally Controlled Plant Growth Chambers for Undergraduate Laboratories"

Through the purchase of four controlled-environment growth chambers, the Pomona College Biology Department is creating a facility in which to conduct experiments on a variety of aspects of plant growth and reproduction. These experiments will improve the training of upper-division biology majors in several different sub-disciplines: (1) it will permit the investigation of the effects of temperature, light levels, day length, and humidity on many aspects of plant metabolism, growth and development (Plant Physiology); (2) by providing homogeneous environments for plant breeding studies, it will allow the measurement of heritabilities of quantifiable characters, and hence the study of the effects of natural and artificial selection on polygenic traits (Evolutionary Biology); (3) by providing homogeneous environments, it will facilitate experimental investigations of the effects of competition among plants (Ecology). These experiments will train undergraduate students in techniques valuable not only in pure research, but also in applied fields such as agriculture, and will help to generate interest in and excitement about the biology of plants.

Richard J. Shavelson Behavioral Sciences Department Rand Corporation Santa Monica, CA	SPA-8652105 $44,953 Science, Math and Technology

"Monitoring National Progress in Mathematics, Science, and Technology Education"

This is an amendment to a grant previously awarded to the Rand Corporation (OSA 84-70440). The original grant was for developing and evaluating alternative, prototype indicator systems designed to monitor the condition and progress in elementary and secondary science and math education. Under the original grant, the blueprints for these alternative systems will provide specifications for (a) monitoring student achievement in elementary and secondary school mathematics and science; (b) monitoring salient education and process factors that affect achievement; (c) determining how achievement and school participation are associated with home and community factors; (d) determining whether general trends in achievement are consistent across subgroups, including minorities, women, and gifted children; (e) conducting special studies that support the technical monitoring function or bear on timely policy decisions; (f) integrating data from other sources (e.g., demographic, economic, social trends) with the monitoring-system data; and (g) reporting national progress to policymakers, educators, and the public.

At a March 1986 meeting of the project's National Advisory Board, it was recommended that subpanels of the advisory board be convened to address two topics, as follows: (1) Current and future policy issues that a national monitoring system must address; and (2) Development of indicators of math and science quality. In addition, the Rand work to date has suggested fruitful areas of future research involving an expansion of the indicator domain. This future research will require additional staff support to carry out expanded tasks associated with the definition and measurement of indicators, the cost of collecting data on them, and identification of alternative monitoring systems.

SRI International	SPA-8651540
Menlo Park, CA 94025	$1,576,008
	12 months

"Contract: Assessment of Initiatives Available to NSF to Address Problems and Opportunities in Science Education"

As part of the Fiscal Year 1985 appropriation of $82 million for NSF's Science and Engineering Education activities, Public Law 98-371 provided that "$2,000,000 shall be made available for a contract to develop a science education plan and management structure for the Foundation." This study represents a major part of NSF's response to the Congressional mandate.

The purpose of the study is to assess the advantages and disadvantages of alternative initiatives to NSF to address problems and opportunities in science education (broadly defined to include science, mathematics, and engineering), with particular attention to high-leverage, realistic programs. The study will focus on initiatives the Foundation has put in place to meet its objectives. In addition, the study will identify new initiatives, not yet in place or funded, and possible management plans which also might prove useful in meeting NSF's objectives.

The main study tasks are:

o To review the prior experience of NSF and others in funding and evaluating science education programs;

o To assist in operationally defining program objectives so that the outcomes of NSF initiatives can be realistically and clearly measured;

o To assess the advantages and disadvantages of alternative initiatives available to NSF to meet its objectives; and

o To design plans for the Foundation to evaluate, on an ongoing basis, the quality and impact of its work.

The result of the study will be an increased NSF capability to define science education program objectives, assess the initiatives taken to meet these objectives and, informed by ongoing assessment, institute necessary changes in these initiatives.

Judith Threadgill-Sowder	MDR-8550614
Department of Mathematics	FY 86 $218,711
San Diego State University	FY 87 $164,760
San Diego, CA 92182	14 months

"The National Council of Teachers of Mathematics Research Agenda Project"

Research efforts in some areas of mathematics education have developed to a point where consensus is needed to establish a conceptual framework to guide future inquiry. The Research Advisory Committee of the National Council of Teachers of Mathematics has identified four such areas: teaching and learning of middle school number concepts, effective mathematics teaching, the teaching and learning of algebra, and the teaching and evaluation of problem solving.

The proposed project will establish working groups in these areas. Each of the four groups will meet for a four day conference to consider the significant issues in the area. Each conference will feature presentations by authors of invited papers, small group discussion sessions, and plenary sessions. The purposes of these conferences are to synthesize the current knowledge base in each area, identify significant directions for future research, and develop collegial research groups. Four monographs, one from each working group conference, will disseminate invited papers, conference proceedings, and the research agendas established by the conference participants. A fifth monograph will contain a variety of viewpoints on the proceedings and resulting agendas through retrospective papers by members of the project advisory council.

Elsa Feher	MDR-8652146
Department of Natural Science	FY 86 $59,280
San Diego State University	12 months
San Diego, CA 92182	

"Investigating Children's Concepts of Light and Vision in a Science Museum Setting"

This exploratory project will study the intuitive notions of light and vision that are held by children ages 10-14. A novel feature of this work is that it takes place in a science museum and uses interactive exhibits as the tasks that mediate the interviews with the children. The project is expected to yield results that are novel and that complement those obtained from work done in the school setting. The specific aims are: (1) to expand the existent empirical data on the explanations given by children by exploring the subject matter area of optics-shadow-formation, images and color; (2) to determine the nature of tasks, activities and experiences that enhance conceptual understanding and aid the child's development of scientifically valid concepts; (3) to determine what overall organizing principles are most useful for the researcher and for the teacher.

The project will begin to explore the practical applications of this research for (1) exhibit design and, by extension, classroom activities; (2) the use of hands-on museums for exhibit-based learning and teaching; (3) strategies for enhancing concept acquisition that can be used for curriculum development and teacher education in both formal and informal settings.

John B. Ferguson	CSI-8650672
Department of Physics	$13,820
San Diego State University	Physics
San Diego, CA 92182	30 months

"The Use of Microcomputers in Electronics Laboratories"

The Physics Department of San Diego State University will computerize its advanced electronics laboratory by introducing microcomputer aided measurement and analysis to the present experimental program. Approximately 100 science students each year will benefit from this program, both in learning how to use modern microcomputers and in speeding repetitive measurement tasks with their assistance. Each student lab station will have a host Macintosh microcomputer connected to a smaller data acquisition microcontroller. Electronic data measurements will be made by the microcontroller upon student order to the host computer. The numerical values obtained will be sent back to the host for further analysis.

Jane M. Day	CSI-8650753
Department of Mathematics	$25,140
San Jose State University	Mathematics
San Jose, CA 95192	30 months

"Applied and Computational Mathematics Laboratory"

This project involves the development of a computer laboratory for applied and computational mathematics. A number of recent national reports have stressed the need for stronger emphasis on computational mathematics education. The laboratory will enhance San Jose State University's applied mathematics and computational mathematics courses by providing them with a good laboratory component where students can carry out numerical experiments and see illustrations of results in applied mathematics.

In addition the lab will provide support for San Jose State's innovative Applied Mathematics and Computer Science Clinic. The purpose of the Clinic is to give students the opportunity to do real-world problem solving as part of a team in a setting which is not usually encountered in undergraduate education. Problems arising in the Clinic are usually complex and evolve as the problems are studied. For such problems substantial computing power is required.

The laboratory will consist of 8 IBM AT microcomputers and DSI co-processor and memory boards. This combination will result in a machine much faster than the basic computer and with 4 MB of memory.

Chris K. Kjeldsen
Sonoma State University
Rohnert Park, CA 94928

TPE-8650086
$215,563
36 months

"Impact of Hazardous Materials on Man and the Environment: A Summer Institute with Academic Year Follow-up for San Francisco Bay Area High School Teachers"

This project funds a two-week summer workshop providing scientific background and knowledge needed to integrate into the curriculum issues relating to hazardous materials.

The program will consist of lectures, discussions, and laboratory work, as well as field trips to a petroleum facility, a geothermal steam field, a regional sewage and water purification plant, an air and water quality testing facility, an agricultural experimental station, and a recycling plant.

The workshop during the first summer will recruit 30 secondary teachers of biology from the San Francisco Bay area. During the second summer, 30 secondary life and physical science teachers will be eligible to attend. During the third summer secondary Mentor Teachers from throughout Central California will be invited to attend.

The activities during the subsequent academic year will consist of three one-day workshops and visits to the classrooms of the individual participants.

In addition to the content material and the support provided by the university faculty and mentor teachers, appropriate curriculum materials will be developed.

Douglas Rustad
Department of Chemistry
Sonoma State University
Rohnert Park, CA 94928

CSI-8650464
$16,010
Chemistry
30 months

"Introduction of Fourier Transform Infrared Spectroscopy into the Chemistry Curriculum"

The purpose of this project is to introduce Fourier transform infrared spectroscopy (FT-IR) into the undergraduate chemistry curriculum. FT-IR is an advanced technique used widely in industrial and academic chemical research. FT-IR spectroscopy allows improvements in the quality of chemistry instruction by providing high resolution spectra and computer-assisted analysis and presentation of spectral data. A low-cost FT-IR spectrometer, capable of providing high-quality spectral data, will be used in at least four courses spanning three sub-areas of chemistry: organic, physical, and instrumental analysis. In addition, this instrument will be used extensively as an analytic tool in undergraduate research. The use of the FT-IR spectrometer will result in direct experience with FT techniques, and will allow new, pedagogically superior experiments to be integrated into several laboratory classes.

Allan K. Hansell	CSI-8650393
Department of Biology	$31,000
St Mary's College of California	Biology
Moraga, CA 94575	30 months

"Improved Undergraduate Laboratory Instruction in Cellular and Molecular Biology"

The goal of this project is to assist the Biology Department at Saint Mary's College to strengthen undergraduate laboratory instruction in cellular and molecular biology. The ultracentrifuge and liquid scintillation counter purchased through the project will have a major impact upon the improvement of laboratory work involving the preparation, use, and analysis of subcellular organelles, viral particles, and such macromolecules as DNA, RNA, and proteins.

The ultracentrifuge has become an essential tool in laboratories doing preparative work with DNA and RNA, or with subcellular fractions such as ribosomes, mitochondria, and viruses. The scintillation counter is used in conjunction with the ultracentrifuge to quantify the incorporation of radioisotopes into these fractions. Experimental work with these two instruments is now basic to advances in a broad range of scientific fields. It is important that students become familiar with the use of such modern instrumentation and thereby gain an appreciation of current research strategies in cellular and molecular biology.

As St. Mary's moves to modernize and strengthen the biology curriculum, more emphasis is being placed on laboratory experience in cellular and molecular biology--one of the core areas in the department. Older courses in Cell Biology, Biochemistry, and Microbiology all will benefit greatly from the acquisition of an ultracentrifuge and liquid scintillation counter--instruments essential for the new course in Molecular Biology and for more sophisticated student research projects. They will allow significantly improved "hands-on" laboratory experience for undergraduate biology majors.

Marjorie H. Gardner	MDR-8550182
University of California-Berkeley	FY 86 $149,686
Lawrence Hall of Science	9 months
M-11 Wheeler Hall	
Berkeley, CA 94720	

"FOSS: Full Option Science System"

The Full Option Science System (FOSS) is a new concept in elementary school science education proposed by the Lawrence Hall of Science. FOSS will be an integrated teacher-education program and classroom instructional package for general education in grades 3 through 6. The instructional package will be based on tested, reliable pilot activities: the SAVI/SELPH (Science Activities for the Visually Impaired, and Science Enrichment for Learners with Physical Handicaps). The teacher education component will be based on pilot coursework used at the Lawrence Hall of Science. The materials used to prepare teachers to be effective, confident science teachers will be the same materials used in the classroom to teach students. Products of the project will include mini-units of hands-on activities covering a broad range of science topics, student equipment and teacher's guides, and a number of supporting documents.

Research into two important aspects of science instruction will also be conducted. The project will focus on the problem of delivery and management of student equipment and on the factors that encourage the replication and perpetuation of teacher education activities.

Marjorie H. Gardner	MDR-8550921
Lawrence Hall of Science	FY 86 $52,744
University of California-Berkelely	9 months
Berkeley, CA 94720	

"Planning Conference: Strengthening the Research Base for Science Education"

Science education requires a solid research base if long-term gains in educational quality are to be achieved and consolidated. This research base must take account of the content and structure of subject matter disciplines, the contexts in which science teaching occurs, and the principles of teaching, learning, and reasoning in scientific domains that are emerging in research.

This project will convene a planning conference on research for science education that will bring together forty leading professionals who are experts in (1) subject matter disciplines of science, mathematics and computer science; (2) the study of classroom teaching and curriculum development; and (3) the study of cognitive processes of learning, reasoning and problem solving. Conference participants will assess the current state of knowledge, examine the prospects for advances based on currently available resources, and identify activities likely to significantly increase this knowledge and lead to changes in educational practices in science education.

Project participants will develop plans for further collaboration and follow-up activities. In addition, the participants will draw up a specific set of recommendations and priorities for mathematics, science and technological education, including suggestions concerning the relative merits of various research methodologies.

Conference proceedings will be published and distributed to 3,000 members of professional educational research societies, universities, research centers, funding agencies and other interested parties. Results of the conference will be discussed in organized symposia and will be presented at appropriate professional meetings in 1986.

Wendell H. Potter	TPE-8550162
University of California	FY 86 $164,158
Davis, CA 95616	FY 87 $155,000
	Physical
	17 months

"UCD/Northern California Science Project for Precollege Secondary Honors Teachers of Physical Science"

This Leadership Activities project will provide enhancement and professional development experiences for 40 exemplary secondary school physical science teachers from 15 counties throughout central and northern California. The overall goals of the multiyear project involve the updating and deepening of the participants' physical science backgrounds and teaching methodologies, the networking of the participants and university science faculty, the conduct of in-service workshops by the participants in their home schools, appropriate recognition for honors teacher participants, the dissemination of the project materials and results to nearby school systems, and the investigation of the modelistic approach within a carefully planned documentation, assessment and evaluation effort.

Selections of participants by a faculty and school committee will be based upon detailed applications requiring expressions of teacher and school commitments to implement project emphases. Working with university scientists, a full-time science curriculum specialist and four mentor teachers, the participants will complete a three-week summer workshop and monthly day-long meetings designed to increase their conceptual understanding of physical sciences, to develop strategies and materials for teaching thorough understanding of fundamental concepts and principles, and to develop materials and techniques for use in their presentation of in-service workshops. Participants will earn academic credits from the University of California, Davis. During the in-service workshops which the participants will design and conduct, the science curriculum specialist and other project staff will be available for consultation and support. Participants will be visited and observed in their classrooms and in their workshops with their peers. Careful documentation and analysis of these observations and of teacher reports will provide a significant basis for a detailed project evaluation.

Curtis D. Abdouch
University of California
Irvine, CA 92717

TPE-8651442
$62,412
Zoology
12 months

"UCI CAUZ Project"

This program will promote the benefits of using underutilized and often misused education resources of zoological parks. The project will involve the University of California at Irvine, Santa Ana and Irvine School Districts, San Diego and Santa Ana Zoos, and other members of the recently formed Consortium of Aquariums, Universities, and Zoos (CAUZ). Thirty-five Orange County intermediate local teachers will have the opportunity to enhance their understanding of science content and their professional experience through this unique cooperative effort.

The four-week summer workshop will approach natural science through tropical forest and biological concepts. The proposed result will be the development of a model classroom science program that will be easy to use and feature exciting dimensions of teaching and learning.

Leigh Burstein
Center for Study of Evaluation
Graduate School of Education
University of California
405 Hilgard Avenue
Los Angeles, CA 90024

MDR-8651603
FY 86 $130,048
12 months

"Second International Mathematics Study: Student Growth and Classroom Processes in Lower Secondary School"

A report on the international results from the longitudinal portion of the IEA Second International Mathematics Study (SIMS) will be prepared by an international team of mathematics educators and other educational researchers and will appear as Volume III in a series to be published by Pergamon Press, London. SIMS is a cross-national study of the content of the curriculum, what is taught and what is learned in school mathematics at two age/grade levels, Grades 8 (Population A) and 12 (Population B), in the United States and several other countries.

This investigation will examine mathematics learning ("growth") during the course of a year of instruction and its relationship to specific teaching practices and processes in lower secondary school mathematics classrooms (Population A) in eight participating countries [Belgium (Flemish), Canada (British Columbia and Ontario), France, Japan, New Zealand, Thailand, and the United States]. This investigation of student performance and teaching practices, within a broader socio-cultural perspective than is possible using only within-country data, represents a unique opportunity to inform national policies and practices at a time of concern about the quality of American mathematics and science education.

Robert L. Wild
Donald C. McCollum
University of California
Riverside, CA 92521

TPE-8650096
$55,582
Physics/Phys.Science
24 months

"Local and Regional Teacher Development Program; Retraining and Upgrading Precollege Physics and Physical Science Teachers"

The University of California, Riverside, is sponsoring a program to retain current physics teachers who are teaching outside their college major, in order to improve their classroom presentation. The program will provide specific teaching aids, and will review the mathematics essential to the teaching of physics.

Twenty-eight high school and junior high school teachers of physics and physical science will attend a four-week summer workshop. Participants will be drawn from the Riverside and San Bernardino County Schools.

Weeks one and two of the workshops will cover a number of basic physics principles and the construction of demonstrations which explain these principles. In addition to previous activities, week three will review the mathematics necessary to the teaching of physics and will incorporate computer usage. Week four will be devoted to the specific interests and problems of the individual participants. Teachers will return to their schools with lecture-demonstration devices designed and built during the summer.

The workshop will be supplemented by a series of guest lectures. During the academic year, there will be two one-day workshops in February and May, where teachers will share their experiences of incorporating the materials into their classes.

Paul D. Saltman Robert A. Dean University of California at San Diego La Jolla, CA 92093	TPE-8554593 $266,114 27 months

"UCSD Science Teacher Institute for Crossover and Science Background Deficient Middle/Junior and Senior High Teachers"

This project is a partnership among San Diego County school districts, the University of California-San Diego, and industry to improve the quality of teaching at the middle/junior high school and senior high school levels.

Year one will address the needs of participants from the middle/junior high schools. Year two will address the needs of participants from the high school. The target population will include teachers of science courses with background deficiencies in science as well as those with science backgrounds but who lack sufficient training in teaching methodology.

Fifty teachers from the San Diego County schools will be selected each year.

The summer phase will be a six-week program consisting of intensive subject area seminars, methodology workshops, and some internships in laboratory setting.

School year activities will include the initiation of a hot-line to the San Diego County Office of Education, follow-up visits to the participants' schools, and a monthly colloquium.

Julian Weissglass University of California Santa Barbara, CA 93106	TPE-8550283 FY 86 $349,606 FY 87 $349,606 FY 88 $349,606 Mathematics 12 months

"Improving Mathematics Education Through Site-Based Change"

The University of California, Santa Barbara, will develop and implement classroom curricula, both content and methods of instruction, through site-based change over a period of three years. During the first year, the project will initially involve seven schools from Ventura and Santa Barbara Counties. This will be expanded to 13 in year two and to a total of 19 schools in the third year. Teaching specialists, classroom teachers who have been selected and trained to act as resource persons and trainers for their colleagues, will serve for one year on a rotating basis.

The project provides an opportunity for administrators, parents, the community and teachers to work together. It provides training and ongoing support for a cadre of lead teachers, to develop methods that assess student understanding. The activities of the Tri-County Mathematics Project and the UCLA Partnership have been incorporated in the project. Much of the in-school activities will be carried out during one released day each month and six hours per month of after-school meetings.

Ronald W. Henderson	MDR-8550386
University of California-Santa Cruz	FY 86 $103,524
1156 High Street	12 months
Santa Cruz, CA 95064	

"Life Lab Elementary Science Program: Curriculum Development and Field-Testing"

The activities of this project will build upon the nationally recognized Life Lab Elementary Science Program. Project Life Lab is a garden-based, experiential science program in which elementary students learn concepts in biology, chemistry, physics, nutrition, earth science and mathematics. In the Life Lab, students explore science through classroom exercises and practical activities in the garden laboratory, and work cooperatively in solving scientific problems and making decisions on the basis of the data they have collected.

This program began in 1978 when Green Acres Elementary School in Santa Cruz, California, built a small greenhouse on its grounds. Though the greenhouse was intended for recreational purposes, teachers soon found that their students were learning science from their gardening work, and enjoying it thoroughly. Over the next five years, teachers, administrators and community members developed the greenhouse project into Project Life Lab, a multi-disciplinary science program. Life Lab lessons integrate concept learning and practical applications in ways that demonstrate to students that science relates to everyday life.
This project will continue development of curricular materials, initiate development of assessment instruments, identify essential conditions for successful adoption of the program, and define an organizational framework for elementary science education.

David Logothetti	TPE-8550571
University of Santa Clara	FY 86 $ 88,615
Santa Clara, CA 95053	FY 87 $ 93,000
	Mathematics
	12 months

"High School Teachers Honors Workshop in Integrated Mathematics"

This Leadership Activities project will provide enhancement and professional development experiences for 25 exemplary secondary school mathematics teachers from Santa Clara County, California public and private schools. The overall goals of the two-year project involve the updating and deepening of the participants' knowledge of problem solving and integrated approaches to school mathematics topics and teaching methodologies, the networking of the participants and university mathematics faculty, the conduct of follow-up sessions and in-service workshops by the participants in their home schools, appropriate recognition for honors teacher participants, and the investigation of the modelistic approach within a carefully planned documentation, assessment and evaluation effort.

Selections of participants will be based upon detailed applications requiring expressions of teacher and school commitments to implement project emphases. Working with university mathematicians, the participants will complete a 16-day summer workshop and eight monthly, day-long meetings designed to increase their conceptual understanding of, and commitments to, integrated treatments of mathematical topics, to develop strategies and teachng plans for problem-solving applications in their own curriculum, and to develop materials and techniques for use in their presentation of in-service workshops. They will earn graduate academic credits from the University of Santa Clara. During the preparation of the in-service workshops which the participants will design and conduct, the project staff will be available for consultation and support. Participants will be visited and observed in their classrooms and in their workshops with their peers. Careful documentation and analysis of these observations and of teacher reports will provide a significant basis for a detailed project evaluation.

Horacio G. Ferriz	CSI-8650890
Department of Geology	$10,903
Whittier College	Earth Sciences
Whittier, CA 90608	30 months

"A Personal Computer-Based Image Processing System for Earth Science Instruction"

The analysis of digital spectral data obtained by satellite and air-borne scanners is being used to improve undergraduate education in earth science at Whittier College. Recent technological improvements now permit image processing using personal computers so that the digital data can be processed and displayed on a television screen without the need for large computing facilities. The digital images thus generated resemble aerial photographs of very large areas and are of interest to earth scientists, land managers, policy makers, social scientists, and others. The system is being used as a flexible tool which allows students to manipulate the data to suit their particular interests. A new course in the applications of remote sensing has been developed, aimed at science and non-science majors, and modifications have been made in the laboratory work of six lower- and upper-division courses. Through these several improvements and new initiatives, students are being introduced to one of the most recent techniques of data acquisition and analysis, thus faciliting their appreciation of regional relationships, of the importance of spatial and space-time perceptions, and of the connections between geology and other disciplines.

COLORADO

Presidential Awards for Excellence in Science and Mathematics Teaching

Ronald B. Schnacken
Mathematics
Steamboat Springs High School
Steamboat Springs, CO 80477

Ted K. Tsumura
Science
Overland High School
Aurora, CO 80012

Fellowships

Colorado School of Mines Golden, CO 80401 Graduate Research Fellowships Support Grants	$16,350
Colorado State University Fort Collins, CO 80523 Graduate Research Fellowships Support Grants	$61,350
University of Colorado at Boulder Boulder, CO 80309 Graduate Research Fellowships Support Grants	$184,020

James D. Ellis
Biological Sciences Curriculum Study (BSCS)
Colorado Springs, CO 80903

TPE-8650174
FY 86 $ 93,616
FY 87 $108,164
FY 88 $112,466
12 months

"A Model for Teacher Enhancement in Educational Computing in the Sciences"

This three-year project will train 260 science teachers and administrators in the Pikes Peak region to use the computer to enhance learning/teaching. Thirty of those participants will be trained as leaders in educational computing in their school districts. Upon completion of year three, these district leaders should be fully trained to prepare and supervise science teachers in educational computing. The task of maintaining the teacher preparation activities will be assumed by these leaders with support from their districts.

During year three, the project staff will concentrate on evaluating the effectiveness of this teacher preparation model, and establishing a self-sustaining teacher preparation network in the Pikes Peak region. The network will include advisory committees on educational computing in the sciences within each district and a committee for the Pikes Peak region to facilitate interactions among cooperating districts. During year three, the project will be operating independent of the project staff, and the management of the network will be the responsibility of the districts.

Joseph D. McInerney
BSCS-Colorado Springs
Colorado College
The Center for Education in Human
  and Medical Genetics
Colorado Springs, CO 80903

MDR-8651534
FY 86 $157,338
18 months

"Development of a Four-Week Module on Genetic Technology for High School Biology"

The practical and intellectual contributions of genetic technology (g.t.) range from genetic screening to improved understanding of the immune response. The ethical and regulatory implications have raised considerable debate, and there is strong consensus among scientists, educators, industry representatives, specialists in bioethics, and policymakers that public education is necessary for effective participation in debates that will confront U.S. citizens about the use of g.t.

Unfortunately, sound information about the subject has made its way into the high school biology classroom only haphazardly. There is little attention to the basic biological mechanisms involved or to improved understanding of biological concepts that result from research in g.t., nor is there much reasoned analysis of the ethical and legal implications.

BSCS, will design, develop, field test, and prepare for commercial distribution a four-week module in g.t. for use in the general high school biology curriculum. The module will be planned and written by experts in medical and agricultural genetics, bioethics, and high school biology teaching. The module will be field tested across the U.S. with a minimum of 600 students.

Jeffrey B. Noblett	CSI-8650474
Department of Geology	$18,420
Colorado College	Earth Sciences
Colorado Springs, CO 80903	30 months

"Equipment for Field Work in Geophysics"

Colorado College has a very strong emphasis on field experience, an emphasis which is encouraged by a unique teaching environment and curriculum. Faculty and students participate in only one course at a time (the Block Plan) allowing a great deal of freedom in scheduling lectures, laboratories and field studies.

Through the acquisition of geophysical equipment for this project (gravity meter, seismometer, magnetomer, resistivity meter), the Geology Department is establishing a field-based geophysics course to round out a strong and growing program and to complement the theoretical course currently offered. In addition, the equipment is being used in introductory and upper-level geology and physics classes for field projects to illustrate theoretical principles. Developing an understanding of the main aspects of geophysical exploration--gravity, seismics, magnetics, electrical--enhances student understanding of the fundamentals of each of the approaches to exploration. This project will provide a significant advance in the geophysics offerings available and will result in improvements in undergraduate instruction in physics and geology.

Owen C. Smith	MDR-8552361
Johannes Gessler	$160,076
Colorado State University	18 months
Department of Electrical Engineering	
Fort Collins, CO 80523	

"High School Project Engineering"

High School PROJECT ENGINEERING is an innovative approach to improving the scientific and technological literacy of secondary school students. It is designed to motivate students through involvement in the solution of actual engineering problems. Students work in teams on realistic and relevant problems. The process begins with an instruction phase in which an engineer, either in person or on videotape, provides background information. Next the students embark on a design phase, in which many aspects of engineering are explored and applied to the particular problem. The teams work within the constraints of project contracts, developing leadership and cooperative team skills as well as knowledge of engineering concepts and practices. Each project produces a design document, a project scrap book, and a finished product or process.

Begun with NSF support in 1984, PROJECT ENGINEERING has developed five videotape programs, a student engineering handbook, a teacher's guide, and various other resources. With the current grant the Project will produce twelve additional videotapes, revise and improve the other materials, test the method at additional sites, and complete the mechanism for disseminating the method nationally.

Jane M. Armstrong	SPA-8650060
Education Commission of the States	$115,558
Denver, CO	Science and Mathematics
	12 months

"State Strategies to Support Science and Mathematics Curriculum: An Assessment Development at the School and District Level"

This project will be designed to answer three research questions: 1) what are effective strategies at the state level that will improve science curriculum content through the use and articulation of state curriculum standards, the selection of instructional materials and student assessment; 2) under what conditions does state action on curriculum standards, instructional materials and assessment work effectively to support improved curriculum content in schools and districts; and 3) how do these strategies define the role and responsibility of the state education agency in improving the quality of science curriculum.

Three states will be studied to identify effective strategies and make comparisons among them for their varying degrees of state initiatives in curriculum and instructional reform and assessment. Five local school districts within each of the three states will be studied to develop a better picture of how state and local strategies are implemented in schools. In addition, two surveys will be conducted to identify existing information on current policies in all 50 states that are designed to upgrade science and mathematics curriculum and assessment; and to identify existing curriculum and assessment practices and state roles in all districts within the three states selected for in-depth analysis. These two survey results will be used to select the three states and 15 local districts that will be included in the study. Districts will be selected to reflect varying levels of success on the state's science assessment, SES and size. They will also be selected based on the extent to which they are implementing state strategies based on the State Education Agency recommendations as reflected in the district survey findings.

A five member advisory committee comprised of a nationally recognized academic science educator, two state education agency science supervisors, a representative of a regional educational laboratory, and a state assessment director, will be formed to guide the development of the field researcher's strategy and to select the states and districts that will form the basis of the study.

Don R. May	CSI-8650420
Department of Engineering	$23,184
Fort Lewis College	Engineering
Durango, CO 81301	30 months

"Improvement in Basic Engineering Education through Computer-Aided Design and Drafting"

A computer-aided design and drafting, CADD, system is being developed for use in the undergraduate curriculum in basic engineering at Fort Lewis College. The CADD approach is being used to varying degrees in different classes (e.g. as a primary apparatus in drafting courses; as a secondary learning aid in mechanics). In this way, undergraduate instruction is being modernized and strengthened, so that undergraduate students in engineering will be prepared for further education and careers in engineering.

Harold Pratt	MDR-8550202
Jefferson County Public Schools	FY 86 $190,032
Science Department	FY 87 $200,000
1209 Quail Street	FY 88 $200,000
Lakewood, CO 80215	

"Junior High/Middle School Life Science Program"

The Jefferson County Public School System is developing a year-long junior high/middle school program in life science which emphasizes the understanding and care of the human body. The development will be done in close cooperation with the University of Colorado Health Sciences Center and with the support of local physicians and university-level scientists and science educators. The program will provide an alternative for teachers and schools seeking materials to improve their life science curriculum and will serve as a resource for schools seeking to integrate health topics with their existing life science course. A part of the program will also direct students toward an ability to make decisions in and about their local environment. Provisions have been made to develop a variety of materials for this portion of the course that will fit other "local" environments, i.e., a variety of exosystems across the country. A text integrating reading activities, laboratory activities, and student questions along with the supporting teacher's guide will be produced.

The Jefferson County Public Schools will be joined in their effort by The NETWORK, Inc. of Andover, Massachusetts. The role of The NETWORK is to create a strong training and support system for the course materials, evaluate their effectiveness, and disseminate the materials on a national basis.

Karen E. Ford	CSI-8650635
Department of Psychology	$16,663
Mesa College	Psychology
Grand Junction, CO 81502	30 months

"Establishment of a Microcomputer-Based General Experimental Psychology Laboratory for Undergraduates"

The main objective of this project is to teach students, via intensive laboratory experiences, the principles and procedures of modern scientific psychology. A microcomputer-controlled general experimental psychology laboratory, including operant conditioning stations and biofeedback monitors, is being established to serve courses in experimental psychology, learning and conditioning, sensation and perception, social psychology, independent study, and a special topics course.

In the new laboratories, students perform representative behavioral experiments using either animals or student volunteers as subjects. Microcomputers assist students in carrying out experimental procedures, collecting data, and performing statistical analyses. These "hands-on" laboratory experiences are teaching the principles and methodologies of scientific psychology more effectively than lecture-oriented pedagogies alone were able to do prior to the initiation of this project.

James W. Giese
George Kobles
Social Science Education Consortium, Inc.
855 Broadway
Boulder, Colorado 80302

MDR-8650040
FY 86 $156,067
FY 87 $215,534
FY 88 $221,749

"Science-Related Social Issues: Computer-Based Decision-Making Exercises"

A three-year project, conducted jointly by the Social Science Education Consortium, Inc., and Omega, Inc., will create a set of eight computer-based decision-making modules focused on public policy issues related to science, technology, and society. Each module will be appropriate for use in grades 7-9 science and social studies courses and will be a self-contained instructional package which can be used by students individually or in small groups.

Issues which tentatively have been identified as subjects for the modules include: Water Diversion and Depletion of Existing Water Sources, Radioactive Waste Management, Can the Projection of Genetic Engineering be Patented?, and Life-Sustaining Medical Technology. The development of the modules will involve participation of experts from the university and precollege education levels, systems analysts, and instructional designers to ensure that the modules are scientifically sound, bias-free and of professional education quality.

Charles M. Shub
Department of Computer Science
University of Colorado - Colorado Springs
Colorado Springs, CO 80933

CSI-8650449
$40,911
Computer Science
30 months

"Operating Systems Laboratory"

The Computer Science Department at the University of Colorado-Colorado Springs will purchase four Sun-3/160 workstations. The project will provide a laboratory and laboratory exercises for students taking a required operating systems course to experiment with the design and implementation of operating system software components. The objective is to provide a laboratory facility for undergraduate computer science students to obtain hands-on experience in the design, implementation, and performance measurement of computer operating systems. In this way students will be able to function better in their careers as computer scientists.

A. David Hill
University of Colorado
Boulder, CO 80309

TPE-8651508
$165,043
Geography
24 months

"Rocky Mountain Geography Teachers' Leadership Network"

This Nation needs more and better geographic education, and it needs teachers and systems well prepared to deliver that education. This Leadership Activities Project responds to these needs. Intensive summer workshops will offer the development of special skills for school district teams consisting of curriculum specialists, master geography teachers, and inexperienced geography teachers. These teams will design, pilot, and evaluate instructional materials that are based upon the most recent developments in geography education. Subsequently, the teams will meet throughout the academic year in special workshops and the staff of the project will visit the participating school districts, visiting classrooms and providing support to the local team members. In the process, teaching modules, syllabi, and in-service geography teacher education programs will be developed, used in school classrooms with students, and evaluated. These programs will be based upon the Guideline for Geographic Education prepared by the Association of American Geographers and the National Council for Geographic Education in 1984. Both the instructional materials and the teacher education models will be evaluated throughout this project.

This project builds upon an NSF-supported project that was successfully conducted in the summer of 1985. This two-year project will work with larger numbers of participants, ultimately reaching 30 middle/junior high school teachers and 60 high school teachers. The project will create a Great Plains-Rocky Mountain network that is linked to the Geographic Education National Implementation Project. It will contribute to the growth of a regional network of geography educators who will motivate, support, and learn from each other. School districts will share some of the support costs.

Manert H. Kennedy
University of Colorado at Boulder
Boulder, CO

TPE-8550479
FY 86 $ 70,355
FY 87 $ 69,940
FY 88 $ 70,216
36 months

"Building a Resource Network to Serve Colorado's Front Range Communities"

The Colorado Alliance for Science is a consortium of schools, school districts, businesses, industries, institutions of higher education, professional societies, research laboratories, state agencies, and community groups working collaboratively to improve precollege science education in Colorado. The Colorado Alliance is seeking to establish a resource-sharing network in science education aimed toward initiation and maintenance of high-quality science programs in schools. The approach used will involve:

- the school principal working with teachers in a school to develop a high-quality science program in accordance with assessed needs of that school.
- sponsors from industry and from higher education working with teams and helping them locate resources and solve problems.

The project will have five phases: organizations; recruitment and participant selection; planning and exploration; information-gathering and resource development; leadership. New sets of school teams will proceed through these phases starting at the beginning of each year. The project will be started in four schools; six new schools will start the phases in Year II; 11 new schools will join the network and start the phases in Year III. By the end of three "cycles," each of the 19 schools in the Weld County #6 District will have created a high-quality science program uniquely suited to its needs. Teams that start the project in the first cycle will be asked to help guide new teams that enter during cycle #2. Similary, cycle #2 teams will assist cycle #3 teams.

Ruth Hoffman	MDR-8640000
Lucy Grogan	FY 86 $7,868
Connie Rayor	7 months

University of Denver
Department of Mathematics & Computer Science
University Park
Denver, CO 80208-0190

"Future-Oriented Mathematics and Computer Literacy Development Project for Elementary Schools"

This is a supplement to Grant No. DPE 8470128 to enable Dr. Ruth Hoffman to disseminate the results of her work on computer literacy for elementary schools.

One of the outcomes of Dr. Hoffman's project is a revised K-6 mathematics curriculum that incorporates calculators and manipulatives. Another is a computer literacy curriculum for the same grade levels. With support from the supplement, summaries of these curricula will be prepared and distributed to other educators around the nation who are interested in the same issues. Also included will be an outline of an associated teacher inservice program.

CONNECTICUT

Presidential Awards for Excellence in Science and Mathematics Teaching

Daniel J. Record
Science
Portland High School
Portland, CT 06480

Kenneth E. Sherrick
Mathematics
Berlin High School
Berlin, CT 06037

Fellowships

Yale University New Haven, CT 06520 Graduate Research Fellowships Support Grants	$612,300

Bette J. De Giorno	TPE-8650121
Fairfield Public Schools	$265,608
Fairfield, CT 06430	24 months

"Project NETWORKS for Teacher Enhancement in Precollege Science Education"

Project NETWORKS is a staff development program for teacher enhancement in precollege science education in the Fairfield Public Schools, Fairfield, Connecticut. Cooperating community agencies and institutions will provide a variety of professional growth opportunities for teachers of science, K-12, and their supervisors and administrators.

The main goals of the project include the improvement of science education in the schools and revitalization of a mature staff through professional growth incentives. The scheduled offerings will help teachers gain knowledge of science and education content where weaknesses and interests have been identified, become aware of the latest research findings of teaching methodology and learning theory in order to apply them in their teaching and supervision, and experience new educational and science technology in research techniques and skills, such as using the computer as a laboratory instrument.

Ithamar E. Pollak	CSI-8650233
Department of Chemistry	$24,725
Quinnipiac College	Chemistry
Hamden, CT 06518	30 months

"Nuclear Magnetic Resonance (NMR) Spectrometer for Science Students"

This project will provide undergraduate students at Quinnipiac College opportunities to use NMR spectrometry in a number of chemistry courses and in research projects. A 60-MHz NMR spectrometer with lock/decoupler and variable temperature accessories will be used by students in organic, analytical, and physical chemistry laboratories for a variety of applications, such as elucidating molecular structure, analyzing mixtures, and investigating chemical kinetics. The instrumentation will provide experimental capabilities not previously available, and will strengthen the chemistry education of students in a number of science programs.

Holly L. Gorton	CSI-8650309
Department of Biology	$21,620
Trinity College	Biology
Hartford, CT 06106	30 months

"A Modern Plant Physiology Program for Trinity College"

The purpose of this project is to provide the modern laboratory research equipment needed for establishing a contemporary teaching program in Plant Physiology. The improvement plans are the results of an extensive evaluation of the Biology Department by external and internal reviewers. The equipment is being used to create largely an upper-division Plant Physiology course, but some of it also will be used in other upper division courses and in a newly revised Introductory Biology course.

The Plant Physiology course stresses techniques and concepts that are unique to plants (photosynthesis, transpiration, water relations), but also includes projects that will familiarize students with generally applicable techniques while illustrating principles in Plant Physiology (spectral analysis of pigments, tissue culture, photomorphogenesis). The laboratory equipment covers experiments with photosynthesis (an oxygen electrode); transpiration (a porometer); water relations (a pressure chamber and psychrometer); tissue culture (a laminar flow hood); spectral analysis (a scanning spectrophotometer); and photomorphogenesis (an image analysis system and a thermopile). Students using the equipment learn what types of questions each technique can answer. They then design and carry out their own experiments. It is expected that this experience will increase their appreciation for how science proceeds, as well as for the principles of plant physiology. Many students do laboratory research in their senior year, and many go on to graduate school or medical school. This experience with modern equipment and experiment design should serve them well. This project has the potential for becoming a model in modern plant physiology which other undergraduate institutions might adopt.

Priscilla Kehoe	CSI-8650827
Department of Psychology	$14,402
Trinity College	Psychology
Hartford, CT 06106	30 months

"Improving the Undergraduate Psychology Curriculum by Introducing Psychobiological Laboratory Studies"

The Trinity College Psychology Department is strengthening its curriculum by equipping a new laboratory for the study of psychobiology. The biological basis of behavior is evidenced by studying the brain mechanisms that mediate or produce such behaviors. The psychobiologist has a rich assortment of methods to study mechanisms that mediate behaviors important to the survival and well-being of the organism.

The student in this laboratory has the opportunity to study the feeding, drinking, activity, memory and learning patterns of a laboratory rodent, and to discover the brain areas or systems which may direct or mediate such behaviors. The animal's sensorimotor reflexes, activity levels and ingestive responses are examined pre- and post-pharmacological or surgical intervention. Thus students are introduced to the science of objective observation of the laboratory animal's various classes of behavior. Histological examination of the brain tissue should provide significant information of the bi-directionality of brain and behavior relationships. Such knowledge and training provide the college student with an understanding of experimental methodology in a critical area of science, and an objective view of the important marriage of psychological and biological theories.

Peter A. Siver	CSI-8650730
Department of Biology	$12,000
Western Conn. St. U.	Inter & Multidiscipl.
Danbury, CT 06810	30 months

"An Interdisciplinary Approach to Undergraduate Research Using the Electron Microscope"

The acquisition of a vacuum evaporator, an ultra-microtome, and a glass knife maker under this project will enhance the opportunities for undergraduates to conduct laboratory research using the University's transmission electron microscope. Students from the Departments of Biology, Biochemistry, Chemistry, Geology, and the fiber-optics and pre-engineering options will have the opportunity to participate in projects using the electron microscope.

Further, the electron microscope projects will link together all levels of interdisciplinary research activities at the University. It is expected that this approach will enhance the research skills of the undergraduates; increase activity and cohesion among all student levels across departments and disciplines; and increase undergraduate participation at scientific meetings and in the preparation of manuscripts submitted for publication. The project will also combine existing senior research courses, as well as a planned new course in Electron Microscopy, into a continuous learning process spanning the undergraduate years.

DELAWARE

Presidential Awards for Excellence
in
Science and Mathematics Teaching

Louis P. D'Angelo
Mathematics
Archmere Academy
Claymont, DE 19703

Edward Malin
Science
John Dickinson High School
Wilmington, DE 19808

James Hiebert
Diana C. Wearne
Educational Development
University of Delaware
Newark, DE 19716

MDR-8651552
FY 86 $178,226
36 months

"Instruction and Cognitive Change in Mathematics: Learning Decimal Numbers"

The project examines changes in cognitive processes resulting from instructional interventions and applies this information in developing a prototype instructional program. The cognitive processes of interest are those involved in constructing meaning for decimal number symbols and using the meaning to solve decimal number tasks. Previous work suggests that for many students, the lack of meaning for written symbols is the source of low performance across a range of mathematical tasks. Classroom instruction designed to promote cognitive processes that create meanings for symbols is implemented and evaluated in the context of decimal fractions.

Students in grades 4 and 5 will be instructed in whole classroom settings. Written tests and a series of individual interviews will provide information on changes in key cognitive processes and on how such changes are induced by specific instructional events. The information on cognitive change and instructional effectiveness, gathered through a sequence of instructional studies, will be translated into a prototype instructional program for developing meaning for written symbols in mathematics.

Moving from research to practice, from descriptions of students' performance to prescriptions of instructional programs, is a major objective of this program of research. In addition to providing new knowledge and product outcomes, the project provides a model, based on chain of inquiry notions, for translating research into practice.

DISTRICT OF COLUMBIA

Presidential Awards for Excellence in Science and Mathematics Teaching

Blanche S. Brownley
Mathematics
Friendship Educational Center
Washington, DC 20032

Mary E. Key
Science
St. Albans School
Washington, DC 20016

Fellowships

Howard University Washington, DC 20059 Minority Graduate Research Fellowships Support Grants	$16,350

Virginia W. Stern
AAAS
333 H Street, NW
Washington, DC 20005

MDR-8652147
FY 86 $39,663
12 months

"Resource Directory of Scientists and Engineers with Disabilities"

The AAAS Project on Science, Technology and Disability will prepare, publish, and disseminate a revised and updated Resource Directory of Scientists and Engineers with Disabilities. A new edition is needed as a resource for the entire scientific and engineering community.

The major uses of the print version of the updated Directory will be as a source of:

- role models for disabled youth, their families and teachers; and of specific coping strategies for scientists and engineers disabled in mid-career to learn how to continue in their careers.
- experienced consultants for persons who are inexperienced in teaching or working with a disabled person; and qualified peer reviewers.
- experienced personnel to increase the expertise of individuals and groups which provide technologies for disabled persons.

The goal of AAAS is to print 10,000 copies of the Directory by December 31, 1986. The publication will be bound and three-holed punched for easy update every year or so.

Caryl Marsh
American Psychological Association
1200 19th Street NW
Washington, DC 20036

MDR-8550582
FY 86 $ 98,980
FY 87 $ 90,418
FY 88 $115,163
FY 89 $ 62,182
FY 90 $ 45,991

"Understanding Ourselves, Understanding each Other: Psychology's Search--A Traveling Exhibition"

The American Psychological Association, in cooperation with the Association of Science-Technology Centers (ASTC), will develop a series of exhibits on psychology using a discovery room/science laboratory approach. The exhibition will, for the first time, offer museum visitors a first hand opportunity to explore the tools, methods, and concepts of psychology in such areas as thinking and feeling, dreaming and sleeping, perceiving and communicating. The exhibition will travel to eight museums over 30 months through the ASTC traveling exhibition service and will reach over a million visitors.

A wide selection of additional materials and resources such as films, seminars, lectures and workshops will be offered to the participating museums to extend the impact of the exhibition. Plans of the exhibits will be made available to other museums. NSF support represents less than 50% of the total cost of the project.

Bonnie Van Dorn	MDR-8550262
Association of Science-Technology Centers	FY 86 $79,635
1413 K Street NW	FY 87 $58,297
Washington, DC 20036	

"Survey of Science Museums"

The Association of Science-Technology Centers, representing some 170 science museums, receives regular requests for information on the status of science museums, their education programs, exhibits and other activities. To respond to this need, the organization will collect and analyze data on the status and activities of both member and non-member science museums.

The material will be published as three reports and made available on computer disks for further study. The information is particularly useful to communities considering new museums, and to trustees and contributors to current museums and others who have an interest in the priorities and policies of education and exhibits programs. The project will be assisted by an advisory committee and Dr. Sue Smock, Director of the Center for Urban Studies, Wayne State University.

Ramsay Selden	SPA 86-51621
State Education Assessment Center	$196,483
Council of Chief State School Officers	Science and Mathematics
Washington, DC	12 months

"State-Based Network to Develop Math/Science Indicators"

This is an unsolicited proposal for the Council of Chief State School Officers (CCSSO) to work with state education agencies to develop better indicators of precollege education in math and science. An inventory will be conducted in the states to identify the information they now collect on the dimensions and quality of math and science education using the framework being developed for such indicators by the National Research Council, the RAND Corporation, and the University of Wisconsin. These indicator concepts and models will be applied to a data-collection "shuttle" process to describe how each state defines and collects such information.

The project will work to meet the complementary needs for a system of indicators in math/science education that serves program managers and policy-makers at both the state and national levels. The project capitalizes on the role states are playing in educational monitoring and reform, while exercising national leadership to bring about quality, comprehensiveness, and comparability in the data they collect and use.

Jeffrey A. Owings	SPA 86-51563
Center for Statistics	FY 86 $115,000
Department of Education	FY 88 $175,000
Washington, DC 20202	Science and Mathematics
	12 months

"Teacher Supplement to National Education Longitudinal Study of 1988 (NELS: 88)"

This is an interagency transfer of funds to the Department of Education to support jointly the National Educational Longitudinal Survey of 1988 (NELS: 88) to be conducted by the National Opinion Research Center. NELS: 88 is a survey based on the national probability sample of eighth grade students and teachers. These same students will also be surveyed in the 10th and 12th grades and in later years to determine the educational effects in middle and secondary schools on their higher educational and occupational experiences.

This award will support two aspects of the NELS: 88 survey, as follows:

(1) Teacher Survey -- A teacher questionnaire (science and mathematics teachers) will be used in the base-year survey to gather data about the students samples, the student body as a whole, the teachers themselves (their training, career expectations, courses taught, and textbooks used), and the school's facilities, environment, and policies. Approximately 11,000 teachers will be identified to complete the teacher questionnaire;

(2) Math and Science Survey Items -- Two pages of survey items will be added to the eighth grade student questionnaire to ask about student attitudes and aspirations toward math and science. Also, similar items will be asked of the student's parents.

Paul J. Cunningham
Gallaudet College
Department of Biology
8th & Florida Avenue, NE
Washington, DC 20002

MDR-8550905
FY 86 $117,238
FY 87 $115,000
FY 88 $ 80,000

"Microcomputer Technologies in the Facilitation of the Hearing Impaired in the Life Sciences"

The purpose of this project is to produce microcomputer programs suitable for use by hearing impaired students. Several hundred bioscience instructional programs, developed for populations of non-handicapped students, will be identified. The project staff will then select and modify about 30 of these which meet specific criteria required for use by the target audience. Modifications will include changes in the content of the software and the use of more basic and concrete instruction, a simplified vocabulary, grammatical structures more understandable to the deaf students, and increased numbers of visuals.

The project will field test the software with deaf students who are on the campus of Gallaudet College in Washington, DC. These students will be 9th through 12th graders at the Model Secondary School for the Deaf, and freshmen and sophomores in undergraduate programs of the College.

The goal of the project is to improve the availability of microcomputer programs in secondary and post-secondary institutions for teaching deaf students across the United States. These include some 900 high schools/programs/classes for deaf students, and 75 post-secondary programs serving the deaf.

Harvey Goodstein
Gallaudet University
800 Florida Avenue, NE
Washington, DC 20002

TPE-8554408
$327,888
Math/Computer
24 months

"Summer Institute in Mathematics and Computer Science for Precollege Teachers of the Hearing Impaired"

The Department of Mathematics and Computer Science of Gallaudet University will sponsor the 1986-1988 Summer Institute in Mathematics and Computer

Science for Elementary and Secondary Teachers of Hearing Impaired Persons. One hundred and ten elementary and secondary teachers of the hearing impaired from various schools across the country will come to Gallaudet for a six-week workshop in each of three years. Fifteen elementary school teachers and fifteen secondary teachers who will be selected to participate in year one will have the opportunity to choose courses in mathematics, computer literacy, geometry and advanced algebra. Nine credits will be awarded for the completion of these courses which will include training in the basic concepts of mathematics, computer programming and applications and methodology and application of classroom teaching skills.

The project director will be visiting the schools during the school year to observe and follow-up the progress of the teachers in their classrooms. He will offer the resources of the University as well as the project staff to help the teachers improve their mathematics teaching.

Jack G. Chirikjian
School of Medicine
Georgetown University
Washington, DC 20057

TPE-8550988
FY 86 $ 87,202
FY 87 $102,570
FY 88 $118,087
Biotechnology
12 months

"Biotechnology Workshop for Teachers"

The "Biotechnology Workshop for Teachers" will provide 60 biology, chemistry and general science precollege teachers an opportunity to study the basic principles of biotechnology as developed in the past ten years. Specifically this will build the confidence of the participant teachers in the area of biotechnology by updating their knowledge through "hands-on" laboratory participation, providing opportunities to develop laboratory/lecture materials, and learning to use specially prepared molecular biology kits that will be made available to their high school students. The six-week summer workshop will be held at Georgetown University and will include opportunities for independent research and informal discussions on data analysis and experimental design.

The long term goals of this project are first to initiate the training of 60 high school teachers within a 50-mile radius of the Washington, DC Metropolitan area and later to expand this program over a wider area for a broader impact. Another major goal is to develop, in conjunction with private industry, the necessary reagents critical to study areas of biotechnology.

Teachers who show promise of being catalytic focal points in their respective school systems and of having the skills to incorporate the materials in the classrooms and school districts will be selected for this workshop. Follow-up and evaluation procedures by the PI will continue to provide help for the teachers within their classrooms and in their roles as resource persons.

Joan D. Ratteray
Institute for Independent Education, Inc.
Washington, DC 20015

TPE-8550265
$85,417
12 months

"Pilot Teacher-Development Program in Mathematics and Science"

The Institute for Independent Education, Inc., will sponsor a pilot program for the continuing education of 28 teachers from 14 neighborhood independent schools serving minority students. These schools are located primarily in central cities of nine eastern, middle Atlantic, and southern states.

This project addresses the need for upgrading teaching skills and increasing the scope of precollege mathematics curricula. The selected teachers from grades 5-8 will be given the opportunity to increase their knowledge of appropriate mathematics content, develop innovative mathematics problem-solving strategies through the use of hands-on curriculum, develop and reinforce their own critical thinking skills, and improve their potential for good classroom management. This program will be carried out during a two-week summer seminar held at American University, Washington, DC.

Follow-up will include two on-site visits by project staff to each school. Since this is a pilot project, extensive evaluative processes will be carried out immediately following the summer program and during the school year. Dissemination in schools unable to participate will be through the use of distribution of videotapes of lectures and work sessions of the summer seminar.

Glenn R. Ingram	MDR-8651588
Center for Applied Mathematics	$6,000
National Bureau of Standards	6 months
Washington, DC 20234	

"Invitational Seminar for Computer Science, Mathematics, and Science Faculty of Minority Institutions"

This project is a National Science Foundation and National Bureau of Standards outreach program for faculty of minority institutions.

The proposed conference presents an opportunity for NSF to acquaint 25 faculty members from 15-20 minority institutions with relevant NSF programs and NSF in general. It also provides an opportunity for NSF program officers to identify key people at minority institutions who can facilitate the identification of potential reviewers and who can identify researchers and encourage participation in NSF programs.

The strengths of the proposal are that (1) prior conferences have been judged useful to the National Bureau of Standards, (2) joint sponsorship will significantly reduce the costs for all sponsoring agencies and programs, (3) this form of activity moves beyond passive approaches of individual programs and acts as a catalyst for the whole Foundation.

Robert Siegel	MDR-8643963
National Public Radio	FY 86 $10,000
2025 M Street NW	2 months
Washington, D.C. 20036	

"Science Coverage on Public Radio"

National Public Radio (NPR) has been provided with a supplementary award of $10,000 to cover the American Association for the Advancement of Science (AAAS) annual meeting. The funds cover travel, housing and meals for staff and free-lance science reporters for a week of reporting. And also includes meeting with NPR's advisory panel. An additional $3,000 has been raised from private sources to cover total costs.

The AAAS meeting is the largest interdisciplinary science meeting in the world. Support of this project will result in more extensive and thorough coverage of the meetings by NPR for inclusion on prime-time slots of "ALL THINGS CONSIDERED" and "MORNING EDITION." It will also allow the science reporting team to evaluate coverage to date and explore additional methods and reporting techniques to enhance and expand the science programming on NPR.

Philip M. Smith	TPE-8550917
Executive Officer	$300,000
National Academy of Sciences	12 months
National Research Council	
Washington, DC 20418	

"Establishment of a Board on Mathematical Sciences Education"

The National Research Council, the principal operating agent of the National Academy of Sciences and the National Academy of Engineering, has established a 36-member Board of Mathematical Sciences Education (MSEB). Its primary purpose is to provide a continuing national assessment capability for mathematical sciences education at all levels. The Board will provide leadership, service, and coordination through a variety of work products focussed on issues affecting the quality of instruction in the mathematical sciences.

The conception of the MSEB has evolved through a broad base of input from the mathematics and mathematics education communities. Emanating from two national conferences on precollege mathematics education, the Conference Board of Mathematical Sciences endorsed the recommendation of its specially convened task force which urged the establishment of such a board at the National Research Council.

The MSEB will function with an anticipated outreach extending to the state and local levels throughout the nation. Its activities will be conducted through issue-oriented task forces that will report to the Board. The membership is broadly representative to bring perspectives of classroom teachers, local and state school authorities, educational administrators and supervisors, local, state and federal governmental officials, college and university faculties, leaders of professional mathematics and education associations, parents, and employers. An Executive Committee of the Board, chaired by Dr. Shirley A. Hill, will help to guide the overall efforts. Appointments, reports, and other activities of the Board will follow the procedures of the National Research Council.

The purpose of this National Science Foundation grant is to provide initial support for activities in two targetted problem areas, "Framework and Alternative Models for School Mathematics Curricula" and "Study of the Impact of Testing on Mathematics Education K-14." Special committees and panels will be operationalized to prepare concept papers and to design study procedures, to conduct open forums and surveys, and to return specified deliverables. It is expected that each of these problem areas will receive continued attention during the second year of anticipated support. In addition it is expected that a third domain of activity, "In-service Teacher Development", will receive attention and support.

Marcia P. Sward	TPE-8652276
National Academy of Sciences	$84,750
National Research Council	Mathematics
Washington, DC 20418	6 months

Symposium on "The Policy Implications of International Studies in Mathematics Education"

The National Research Council, the principal operating agent of the National Academy of Sciences and the National Academy of Engineering, has established a 36-member Board on Mathematical Sciences Education (MSEB). Its primary purpose is to provide a continuing national assessment capability for mathematical sciences education at all levels. The Board will provide leadership, service, and coordination through a variety of activities and work products focussed on issues affecting the quality of instruction in the mathematical sciences.

The purpose of two previous National Science Foundation grants was to provide initial and supplemented support for activities in two targetted problem areas, "Framework and Alternative Models for School Mathematics Curricula" and "Study of the Impact of Testing on Mathematics Education K-14." Considerable progress has occurred during the past five months in each of these areas of activity, and it is now appropriate for the MSEB to undertake other initiatives in its original plan.

This grant will provide support for the MSEB to begin activities in another important domain of national issues and problems resulting from international comparisons of mathematical sciences education. In recent years several such studies have been conducted. These have been reported without ample opportunity for deliberation of implications for federal, state, and local policies. Through the conduct of this special national symposium the MSEB will stimulate and coordinate a major effort to:

- interpret significant results from various international investigations;
- develop policy implications and specific recommendations for improving mathematics education in American schools; and
- foster effective dissemination of these ideas through special materials produced for, and subsequent to, the symposium.

The National Academy of Sciences, acting through the MSEB, provides the context and prestige necessary to attract significant researchers, educators, governmental officials, and concerned citizens to this important activity and to assure a nationwide attention by educational policy makers.

Susan Sherman
National Research Council
National Academy of Sciences
Washington, D.C. 20418

RCD-8650073
$1,270,210
14 months

"Providing Evaluative Services for the NSF Graduate Fellowship Program, NSF Minority Graduate Fellowship Program, and Accompanying Ancillary Services"

This grant provides for the following services:

(1) Processing and evaluative services for the National Science Foundation Graduate Fellowship Program;

(2) Processing and evaluative services for the National Science Foundation Minority Graduate Fellowship Program;

(3) Funding for a subcontract with the Educational Testing Service, Princeton, New Jersey to supply appropriate Graduate Record Examination data associated with applicants for the Graduate Fellowship Program and the Minority Graduate Fellowship Program and for the payment of test fees for approximately 1,800 applicants;

(4) Ancillary services including the updating and maintaining of the Cumulative Index, Institutional Code Book, Fellowship Opportunities Booklet and Annual Survey of Tuition and Fee Charges.

John M. Fowler	TPE-8550934
National Science Teachers Association	$9,945
1742 Connecticut Avenue, N.W.	6 months
Washington, DC 20009	

"A Proposal for the Production of a Handbook on Local Alliances for Science and Technology Education"

The Triangle Coalition of Science and Technology Education held a conference on Local Alliances for Science and Technology Education at the Wingspread Conference Center, Racine, Wisconsin. One of the most important outcomes of this conference will be a Handbook on Local Alliances, which will contain guidelines and suggestions for the development and operation of local or regional support groups. This Handbook will include descriptions of existing local organizations which could provide nuclei for local alliances, lists of cooperating professional organizations, examples of local alliance activities, budgets, sources of funding, do's and don'ts for the formation of such alliances, and suggestions for long-range alliance goals and strategies.

Marily DeWall	TPE-8552376
National Science Teachers Association	FY 86 $117,089
1742 Connecticut Avenue, N.W.	FY 87 $135,000
Washington, DC 20009	14 months

"Regional Energy Workshops to Update MS/JHS Science Teachers"

This Leadership Activities project for MS/JHS teachers involves the collaborative efforts of eight electrical utility companies, the National Science Teachers Association, and the National Science Foundation. It will provide a two-week summer workshop for 80 middle school/junior high school teachers at 8 regional centers serviced by the participating electrical utility companies (10 teachers/site), geographically distributed throughout the U.S. A regional committee of science educators will select the participants based upon a formal application and commitment of supervisory personnel in applicant school districts to support participants in follow-up efforts of curriculum implementation and in-service activities. In the proposed second year of the project the numbers of teachers will increase to 120 distributed among 12 regional centers serviced by electrical utility companies.

Workshops will be staffed by appropriate utility company staff, local college and university professors, and environmentalists. A master teacher will be retained at each site to assist participants in developing classroom activities and appropriate in-service programs. Follow-up support will be available to participants from the workshop staffs.

The overall goals of the project focus on increasing the knowledge of the participating teachers in the areas of the science and technology involved in electrical energy production, including the societal, economic and environmental impacts of that production; the translation of that knowledge into appropriate activities for middle and junior high school classrooms; and the communication of that knowledge to colleagues of participants in their schools through in-servics activities.

The classroom activities developed will be piloted in classrooms, revised, edited and published so that all participants will share in the benefits of the collective efforts. National energy education resource guides and curriculum efforts will also be made available to the participating teachers.

Elizabeth C. Hennings	BBS-8614389
Smithsonian Institution	FY 86 $110,313
Washington, DC 20560	12 months

"Poster-Panel Exhibition and Videotape on Biological Diversity"

The purpose of this project is to develop a complete exhibition kit on the topic of biological diversity that can be used in a wide variety of settings, including schools, museums and libraries. The kit will include a series of poster panels, an accompanying audio-visual presentation, and an owner's manual that includes programs and ideas for educators to use in conjunction with the exhibit. The exhibition will be developed by the Smithsonian Institution Traveling Exhibition Service (SITES), building on a National Forum on BioDiversity to be sponsored jointly by the Smithsonian and the National Academy of Sciences in September 1986.

The objective of this exhibit is to educate the public about the need to maintain global biological diversity, the ways in which it is currently threatened, and steps to preserve diversity of organisms and environments. Each year, due to a wide variety of factors, including development, population increase, movement of peoples, and poor agricultural practices, the planet is losing both habitats and living species. The loss of tropical forests, advancing desertification in many areas, depletion of agricultural soils, and polluting of the ocean are serious problems for all countries. Preserving biological diversity is a subject that has been the fundamental principal guiding conservation strategies for the last two decades, but there has never before been a comprehensive exhibit on this topic in the kind of easily accessible format proposed by the Smithsonian Institution.

This project is funded jointly with the Directorate for Biological, Behavioral and Social Sciences.

Patricia A. Rose	CHE-8608842
Student Pugwash USA	$65,000
Washington, DC 20002	($60,000 CHEM)
	($5,000 SEE)
	24 months

"Choices for Our Generation: Ethics at the Cutting Edge of Science and Technology"

This award provides partial support for a week-long conference on "Choices for Our Generation: Ethics at the Cutting Edge of Science and Technology." Selected in a national competition, 90 outstanding students from diverse disciplines meet with senior leaders from academia, industry, government and non-profit organizations for small group discussions as well as general plenary sessions with keynote addresses by nationally-known figures. The conference them focuses attention on the ethical choices students face as they move into positions of increasing responsibility. Applicants prepare papers on specific topics where scientific and technological research and development affect and are affected by these choices; these papers serve to focus the small group discussions during the week. Publication and follow-up activities will reach university students nationwide; the academic science, technology and society (STS) community; science and technology practitioners and policy-makers; high school teachers; and interested members of the general public.

FLORIDA

Presidential Awards for Excellence in Science and Mathematics Teaching

Carol B. Collins
Science
Jefferson Comprehensive High School
Tampa, FL 33607

Maria Gerrity
Mathematics
Rock Lake Middle School
Longwood, FL 32750

FLORIDA

Fellowships

Florida State University Tallahassee, FL 32306 Graduate Research Fellowships Support Grants	$49,050
University of Central Florida Orlando, FL 32816 Minority Graduate Research Fellowships Support Grants	$16,350
University of Florida Gainesville, FL 32611 Graduate Research Fellowships Support Grants	$114,450
University of South Florida Tampa, FL 33620 Graduate Research Fellowships Support Grants	$48,380

Richard F. Copeland	CSI-8650503
Department of Chemistry	$13,596
Bethune-Cookman College	Chemistry
Daytona Beach, FL 32015	30 months

"Ultraviolet/Visible Spectrophotometry and Computer Interfacing in Undergraduate Chemistry"

The focus of this project is two-fold: 1) to provide undergraduates with improved ultraviolet/visible spectrophotometric capabilities for experimentation in analytical chemistry, biochemistry, and advanced laboratory courses and research projects, including capability for conducting kinetics experiments, and 2) to provide computer hardware and software for students to gain experience with computer interfacing for laboratory instrument control and data acquisition. An integrated, multipurpose system consisting of a spectrophotometer, accessories, microcomputer system, and associated software will be used by undergraduate students in upper-level chemistry courses serving chemistry, biology, and medical technology majors. Through this project Bethune-Cookman College, an historically Black institution, will continue its significant contribution to science education of minority students.

Alan L. Soli	CSI-8651041
Department of Chemistry	$6,810
Eckerd College	Chemistry
Saint Petersburg, FL 33733	30 months

"Applications of Liquid Chromatography to Analyses of Marine Plants"

High performance liquid chromatography (HPLC) is a modern instrumental technique used to isolate and analyze components in a mixture. Through this project, Eckerd College chemistry students will apply the theory of liquid chromatography to experimentation using HPLC instrumentation. The equipment will be used by both chemistry and marine science students for the isolation, identification, and quantitation of pigments in marine plants. Students are expected to carry out a complete investigation including research design, sampling, analysis, and interpretation of results. Their studies include determining relative proportions of pigments in various species of marine plants, or in a single species collected at different sites.

Govinder S. Giare	CSI-8650245
Department of Aeronautical Engineering	$32,685
Embry-Riddle Aeronautical University	Engineering
Prescott, AZ 86301	30 months

"A Laboratory Program for the Undergraduate Study of Advanced Composites"

A modern composite materials laboratory is being developed by Embry-Riddle University with the recent acquisition of a scanning electron microscope, an induction furnace and a data acquisition system. With this facility, students in aeronautical engineering are able to fabricate composite materials and structures to meet temperature and other standards common in industry. Students test the materials and structures to determine their behavior and capabilities. The data acquisition system is being used to monitor test results and collect data to develop stress/strain curves, S-N curves (stress against number of cycles) and perform statistical analyses on the uniformity of composite materials. Analyses of test samples at high magnification determine bonding mechanisms, microstructure, fracture mechanics and failure modes. Through these experiences, aeronautical engineering students are being prepared to undertake state-of-the-art work in industry and/or to enter advanced research programs.

Fred C. Senftleber	CSI-8650499
Department of Chemistry	$8,929
Jacksonville University	Chemistry
Jacksonville, FL 32211	30 months

"Utilization of High Performance Liquid Chromatography in the Chemistry Curriculum"

This project will incorporate high performance liquid chromatography (HPLC) into the undergraduate chemistry curriculum at Jacksonville University. HPLC instrumentation will be used by students in Separation Chemistry and Advanced Experimental Chemistry, and for undergraduate research projects. In addition, the HPLC system will be used for special projects by students in the Biology and Marine Science Departments. Experiments in the laboratory courses include investigations of operating parameters; use of ultraviolet, refractive index, and electrochemical detectors; and design of a separation system for analysis of a "real world" sample with a complex matrix. Research projects include joint endeavors between the Chemistry and Marine Science Departments to analyze various pollutants in the St. Johns River, a project to develop a more versatile electrochemical detector for liquid chromatography, studies on rearrangements of ephedrine derivatives and oxidation of phospholipids, and isolation of natural products from marine algae. This project will enhance students' appreciation for the capabilities of HPLC, a powerful modern technique, and develop their expertise in the design and application of chromatographic separations.

Erich E. Blossey	CSI-8650357
Department of Chemistry	$50,000
Rollins College	Chemistry
Winter Park, FL 32789	30 months

"Acquisition of a Fourier Transform Nuclear Magnetic Resonance Spectrometer"

This project will produce a significant improvement in chemistry education at Rollins College by providing state-of-the-art instructional laboratory NMR capability. Students will be introduced to NMR spectroscopy by examining simpler carbon-13 FT-NMR spectra before discussing proton NMR. Acquisition of a 90-MHz Fourier transform NMR will allow students in Organic Chemistry, Physical Chemistry, Instrumental Analysis, Inorganic Chemistry, Biochemistry, and Undergraduate Research to determine carbon-13 and proton NMR spectra with high resolution, to perform experiments involving spin decoupling or effects of temperature, and to gain experience with computer-controlled instrument operation and data acquisition. The FT-NMR will make important contributions to the chemistry laboratory program, complementing curriculum development in the Chemistry Department.

GEORGIA

Presidential Awards for Excellence
in
Science and Mathematics Teaching

Beverly S. Lang
Science
Newnan High School
Newnan, GA 30263

Murray H. Siegel
Mathematics
Walton High School
Marietta, GA 30062

Fellowships

Atlanta University Atlanta, GA 30314 Minority Graduate Research Fellowships Support Grants	$15,000
Emory University Atlanta, GA 30322 Graduate Research Fellowships Support Grants	$16,350
Georgia Institute of Technology - Main Campus Atlanta, GA 30332 Graduate Research Fellowships Support Grants	$193,970
Individual Awards for Foreign Tenure Graduate Research Fellowship	$17,100
University of Georgia Athens, GA 30602 Graduate Research Fellowships Support Grants	$32,700

Karen A. Schultz
College of Education
Curriculum & Instruction
Georgia State University
Atlanta, GA 30303

MDR-8650008
FY 86 $306,548
36 months

Co-PI:

Lynn C. Hart
Kennesaw College
Marietta, GA 30061

"Metacognition, Teachers and Mathematical Problem Solving"

Some mathematics educators have taken the position that metacognition-knowledge and beliefs about cognitive activity as well as awareness and control of that knowledge-is critical to mathematical performance and that research in mathematical problem solving would benefit from exploration of this phenomenon. This project is designed to (1) investigate the relationship between inservice middle school teachers' metacognitive activity and mathematical knowledge and their problem-solving ability, and (2) improve teachers' problem-solving ability through a problem-solving institute focusing on metacognitive knowledge and experience in mathematical problem solving.

Fifteen middle school teachers enrolled in an institute on problem solving and thinking will be the subjects in the study. Subjects will be videotaped solving unfamiliar problems before small groups of their own students and will be tested for problem-solving performance before and after the institute. Techniques for recording and analyzing metacognitive activity are grounded in the work of Schoenfeld (1983), and problem-solving performance will be evaluated using a process/ product scale developed by Lucas et al.(1979) and Schultz (1985).

Preston A. White, III
Dept. of Electrical & Comp.Engr. Tech.
Southern Technical Institute
Marietta, GA 30060

CSI-8650352
$50,000
Engineering
30 months

"Automated Optical Fiber Analysis System for Fiber-Optics Laboratory"

The Department of Electrical and Computer Engineering Technology at Southern Technical Institute will purchase an automated optical fiber analysis system. This system will be housed in the new Fiber-Optic Communication Laboratory which is to be part of the department's Wilder Communications Complex. The system will provide the department's 1,100 undergraduates with state-of-the-art automated test and measurement experience in the new technologies associated with fiber optics. The students will use the computerized system to analyze the performance of optical fiber waveguides, of various fiber-optic light sources and detectors, and of entire fiber-optic communication systems. This laboratory experience will allow the department's graduates to make immediate contributions in the burgeoning new fiber-optic communication industry.

C. I. de Jenga Department of Chemistry Spelman College Atlanta, GA 30314	CSI-8650752 $22,142 Chemistry 30 months

"Incorporation of Gas Chromatography/Mass Spectrometry into Chemistry Courses and Undergraduate Research"

This project will incorporate into the chemistry curriculum at Spelman College principles and applications of gas chromatography/mass spectrometry (GC/MS). New experiments introduced into courses in organic chemistry and instrumental analysis will teach students current state-of-the-art methods of chemical measurement and analysis. In addition, the powerful analytic technique of GC/MS will greatly enhance the ongoing research efforts of undergraduate students. With the addition of GC/MS capability to its honors programs and research projects, Spelman College continues its significant contribution to science education of Black women undergraduates.

James W. Wilson University of Georgia Department of Mathematics Education 105 Aderhold Hall Athens, GA 30602	MDR-8651611 FY 86 $367,754 FY 88 $176,045 24 months

"A Revision of the Geometry and Measurement Strands, K-6"

Geometry and measurement are closely related topics that are, in current elementary school curricula, usually taught in separate chapters. In reality, however, many measurements involve geometric entities. Similarly, many of the properties of geometric figures are derived through work with measurement. Thus it is reasonable that the geometry and measurement strands be considered together. This project will revise both strands, exploiting the natural connections between geometry and measurement to their mutual advantage.

The revisions will be based on theory, the results of previous research, and expert opinion as presented in the literature. The theories of the van Hieles will be a major basis for the revision of the geometry strand. The theory of Piaget will likewise form a basis for revision of the measurement strand. Fourteen prototype units, seven in geometry and seven in measurement, will be developed. Calculators and computers will be used whenever appropriate: in problem situations, in demonstrations, in open investigations, in development and exploration of patterns, and (sometimes) in performing calculations. The goal is to move mathematics curricula from static and rote presentations toward dynamic and meaningful investigations.

James R. Okey University of Georgia Athens, GA 30602	TPE-8643360 $82,665 Computer 12 months

"Stand-Alone Materials for Training Science Teachers to Use Computing in Teaching"

The purpose of this project is to design, develop, implement, and evaluate stand-alone exportable materials for training science teachers to use computing in teaching. This pilot project will develop three demonstration sets of interactive computer/videodisc training materials that will include computer programs, videodiscs, manuals, and built-in progress tests. The specific topics addressed in the three sets of materials will be use of microcomputers for science simulations, computer-based testing, and data analysis and display.

During the first year of the project a market survey was conducted, available computer software in the three areas cited above was surveyed, a computer-based test generation program was developed and tested, and plans for the interactive video sequences and training materials were developed. Final scripting and treatment of the video materials is presently being completed along with preliminary plans for the teacher workbook to accompany the videodisc and computer programs. The video materials will be produced this spring and the computer/video sequences for the videodisc will be done this summer.

During year two of the project, the revised videotape materials will be transferred onto laser discs and the print materials and computer programs will be put in final form. Major school site trials will be conducted and data on the effectiveness of the training program will be collected. Additional project activities for year two include the preparation of a case study of the project, dissemination of the results, and the development of plans for commercial distribution of the materials.

Michael Padilla Edward Davis University of Georgia Athens, GA 30602	TPE-8652036 FY 86 $459,700 FY 87 $285,774 FY 88 $272,141 FY 89 $ 96,647 12 months

"University of Georgia Middle Grades Teacher Education Project"

The University of Georgia will develop a four-year model program for the preparation of both middle school science and middle school mathematics teachers. The proposed effort involves the development of new content courses in both science and mathematics, and the development of innovative "parallel" methods courses for each content course. Each science teacher will complete 35 quarter hours of science content and 15 quarter hours of science education; each mathematics teacher will complete 30 quarter hours of mathematics content and 25 quarter hours of mathematics education. Each student will also complete an innovative course focusing on writing, with special emphasis on mathematics and science.

The proposed program represents a cooperative effort involving scientists, science educators, mathematicians, mathematics educators, teacher educators, and public school personnel. This program will prepare a teacher who has both content knowledge and knowledge of and skill with methods of teaching middle school children. Numerous practicum and clinical field experiences are provided through the program.

Dennis Bogyo	CSI-8650288
Department of Biology	$11,587
Valdosta State College	Biology
Valdosta, GA 31698	30 months

"Improvement of Undergraduate Laboratory Instruction in Biology,Chemistry and Physics through the Purchase of a Liquid Scintillation Counter"

Through the purchase of a liquid scintillation counter (LSC), the Biology Department at Valdosta State College is adding radioisotope experiments to its curriculum in Immunology and Cellular Biology and, to a lesser extent, to laboratory work in Chemistry and Physics. The Cellular Biology laboratory has completed the first phase of its development, and students have grown mammalian cells under varying growth conditions. Acquisition of the LSC completes the second phase of the development plan. Students now are able to carry out experiments at the molecular level. This will enable them to work through techniques which are aimed at gaining a better understanding of principles that lie at the foundation of modern molecular biology. Support for the Physics and Chemistry Departments through this project also contributes to the modernization of their laboratories, enabling all three departments to provide their undergraduates with a safe introduction to laboratory uses of tritium and carbon-14. Valdosta State enjoys an enviable reputation for sending graduates on to advanced studies, and the benefits gained through this project should enhance the preparation received by many of its science majors.

GERMANY

Presidential Awards for Excellence in Science and Mathematics Teaching

James F. Jackson
Science
Heidelberg Middle School
Heidelberg, Germany

GUAM

Presidential Awards for Excellence
in
Science and Mathematics Teaching

Bernice S. Duckrow
Mathematics
St. John's School
Tumon, Guam 96911

HAWAII

Presidential Awards for Excellence in Science and Mathematics Teaching

Betty V. Hart
Science
Aiea High School
Aiea, HI 96701

Stephen S. Maresca
Mathematics
Kamehameha Secondary School
Honolulu, HI 96817

Fellowships

University of Hawaii - Manoa Honolulu, HI 96822 Graduate Research Fellowships Support Grants	$16,350

Robert L. Campbell	TPE-8652008
University of Hawaii at Manoa	$81,029
Honolulu, HI 96822	14 months

"Research-Reuniting Elements of the Science Education and Research Communities in Hawaii"

This project enables 20 junior high and senior high teachers to participate in a research project with scientists or engineers. Teachers and research-mentors with similar interests will work together.

For eight weeks in the summer of 1987 each teacher will review the literature, tools, and techniques needed to be involved in a research project. During the academic year of 1987-88 the teacher will continue the research project after school or on weekends. At least one meeting per month will be held with the mentor-scientists. A major focus during this period will be discussions of how the knowledge and skills learned can be incorporated into the teaching strategies of the classroom. For eight weeks during the summer of 1988 the teachers will again be in the laboratories of mentor-scientists. At the end of the second summer each participant will prepare a written report.

IDAHO

Presidential Awards for Excellence in Science and Mathematics Teaching

Chris L. Gentry
Science
Boise High School
Boise, ID 83702

Shirley G. Ringo
Mathematics
Moscow High School
Moscow, ID 83843

ILLINOIS

Presidential Awards for Excellence in Science and Mathematics Teaching

Timothy D. Kanold
Mathematics
Community High School District #94
West Chicago, IL 60185

Lee R. Marek
Science
Naperville High School
Naperville, IL 60566

Fellowships

Illinois State University Normal, IL 61761 Graduate Research Fellowships Support Grants	$16,350
Individual Awards for Foreign Tenure Graduate Research Fellowships	$34,200
Northwestern University Evanston, IL 60201 Graduate Research Fellowships Support Grants	$122,670
Southern Illinois University - Carbondale Carbondale, IL 62901 Graduate Research Fellowships Support Grants	$16,350
University of Chicago Chicago, IL 60637 Graduate Research Fellowships Support Grants	$602,400
University of Illinois - Urbana Urbana, IL 61801 Graduate Research Fellowships Support Grants	$359,050

Thomas F. Cummings
Department of Chemistry
Bradley University
Peoria, IL 61625

CSI-8650242
$27,237
Chemistry
30 months

"Enhancement of Analytical and Organic Chemistry with a 60-MHz Nuclear Magnetic Resonance Spectrometer (NMR)"

The objective of this project is to enhance the preparation of undergraduate chemistry and other science majors at Bradley University by incorporating the use of a 60-MHz NMR into the chemistry laboratories associated with a number of courses. This instrument replaces and upgrades an obsolete NMR with limited capabilities, allows the introduction of new experiments which illustrate principles discussed in lectures, and expands and updates students' laboratory experience to include new techniques and experimental capabilities. The anticipated outcome of this project is the upgrading and updating of laboratory courses in organic, analytical and physical chemistry, as well as the enhancement of independent study projects. The NMR will enable students to understand better the principles and practice of instrumental chemical analysis and determination of molecular structure.

John A. Cicero
Dept. of Mathematical & Computer Science
Illinois Benedictine College
Lisle, IL 60532

CSI-8650203
$17,905
Computer Science
30 months

"Robotics-Computer Vision Laboratory"

This project will provide undergraduate students with an opportunity to work with advanced robotic systems. The College will acquire five additional HERO Jr. robots, ten digital cameras and ten host computers. The robots will be used to test interface software written to control locomotion, steering, speech synthesis, ultrasonic transducers, and communication protocols between the robot and a host computer. The digital cameras will be used to demonstrate topics in computer vision such as gray level imaging, image reconstruction, boundary and edge detection, and motion detection. The host computer will be used to write, assemble, and save programs written for the robot. It will also be used to display the reconstructed images coming from the camera via the robot. This robotic-computer vision lab will prepare the students for an actual industrial environment and will encourage them to pursue graduate work.

Alba G. Thompson
Illinois State University
Normal, IL 61761

TPE-8652037
FY 86 $146,476
FY 87 $151,300
FY 88 $147,495
FY 89 $142,781
FY 90 $156,251

"A Model Program for Preparing Middle School Mathematics Teachers"

Illinois State University will develop a five-year model program for the preparation of middle school mathematics teachers. The proposed effort involves a major reconceptualization based on the premises that learning mathematics is a constructive process requiring reflective activity and that such activity is facilitated by problem-solving situations. Developmental efforts will include three new mathematics courses, the modification of two additional mathematics courses, and the modification of four pedagogical courses. Teaching methodology in all courses will reflect the above basic premises.

The proposed program represents a cooperative effort involving mathematicians, mathematics educators, and teacher educators. Students will study mathematics content and teaching methodology, be involved in numerous practicum and clinical experiences, student teaching, and a well developed set of induction year activities. The program will prepare a teacher who is mathematically sound and who is knowledgeable and skilled in teaching middle school students. This program will stand as a model for similar types of institutions that have somewhat traditional four-year teacher preparation programs.

Forrest J. Frank
Department of Chemistry
Illinois Wesleyan University
Bloomington, IL 61702

CSI-8650295
$7,627
Chemistry
30 months

"Gas Chromatography in a Forensic Chemistry Course for Non-Majors and in Advanced Laboratory Courses for Chemistry Majors"

This project has two major objectives: (1) to improve substantially the science education of non-science majors and (2) to enhance the upper-level laboratory program for chemistry majors. A modern gas chromatograph (GC) will be used in a new, popular course in forensic chemistry for non-majors. With the GC, students will study methods of arson investigation and analyze the components of flammable liquid mixtures, accelerants, and residues from fires. These investigations provide a vehicle for students who are not science majors to learn important concepts in chemistry, principles of scientific reasoning, experimental design, and critical interpretation of data. Chemistry majors will use the modern GC system, which can be interfaced to the department's computers, for laboratory course experiments and projects in Instrumental Analysis, Organic Chemistry, Physical Chemistry, and Integrated Advanced Laboratory.

Frederick Flener
Northeastern Illinois University
Chicago, IL 60625

TPE-8550878
$148,792
Mathematics
24 months

"High School Mathematics Instructional Improvement: Of the Teachers, By the Teachers, For the Teachers"

This project will improve the subject matter and teaching back-ground of 25 junior high school and senior high school mathematics teachers in the Chicago area. The project will be conducted as separate workshops for each of two years.

Topics will include algebraic content, linear and quadratic equations, Pascal's triangle, MuMath, word problems, geometric concepts, probability, and computer graphics.

The summer workshop will be seven weeks in length. Each daily session will combine content and discussion of ways the materials can be used in regular mathematics classes. During the academic year, the participants' classes will be observed in order to provide constructive feedback. A conference will be conducted during January.

Jon D. Miller
Northern Illinois University
Public Opinion Laboratory
Dekalb, IL 60115
815/753-1901

MDR-8550085
FY 86 $296,783
15 months

"A Longitudinal Study of the Development of Adolescent and Young Adult Attitudes Toward and Knowledge About Science and Technology"

The middle-school and high-school years are a period of change and crystalization in terms of life goals, disciplinary and course preferences, and social and political attitudes. The literature provides a number of cross-sectional descriptions and models concerning cognitive and attitudinal development during adolescence and young adulthood, but there are no longitudinal data available to study these processes.

The proposed longitudinal study will examine the (1) development of interest in science and mathematics, (2) the growth of scientific literacy, (3) the development of attentiveness to science and technology issues, and (4) the attraction to careers in science and engineering among two national cohorts of adolescents and young adults. One cohort will begin with a national sample of 3,000 seventh graders and follow them through the 10th grade. The second cohort will begin with a national sample of 3,000 10th graders and follow them for the next four years through the first full year after high school. Data will be collected from students, teachers, counselors, principals, and parents.

A purposive sample of two or three school districts with exemplary elementary school science and mathematics education programs will be selected and comparable data will be collected in these districts.

The analysis will consist of a series of expanding multivariate developmental models that will seek to understand cognitive and attitudinal growth and change in the context of family, school, and peer influences. Each wave of data collection will provide an opportunity to examine cognitive and attitudinal change measures in an increasingly rich context of previous measures. Periodic reports will be issued with each cycle of data collection and the data will be made available to other scholars on a timely basis.

The first phase of the project, being funded at this time, provides approximately 15 months for instrument development and pilot testing, for sample selection, for monitor selection and training, and for working with the research advisory committee.

Michael G. Prais	CSI-8651103
Department of Chemistry	$26,570
Roosevelt University	Chemistry
Chicago, IL 60605	30 months

"NMR Spectroscopy and Computer-Assisted Laboratory Data Analysis throughout the Chemistry Curriculum"

The immediate goal of this project is to introduce a set of computer-assisted laboratory experiments for NMR spectroscopy which will in turn increase the computer literacy of undergraduate students as they proceed through the chemistry program at Roosevelt University. The project uses a 60-MHz continuous wave NMR spectrometer, an instrument common to many laboratory courses and one which has easily accessible external connections for data acquisition and instrument control. The availability of the extensive ASYST laboratory software package for IBM microcomputers with high-resolution graphics allows students to analyze spectra in a number of ways, and prepares students to use the more expensive laboratory workstations commonly found in industrial and academic research laboratories. This software allows students to focus immediately on analyzing data rather than setting up and programming equipment. The project will provide at least one computerized laboratory experiment in each laboratory course from Organic Chemistry to Laboratory Microcomputer Systems. Since the computerized experiments appear in each upper-division laboratory course, the majority of the 200 chemistry students will have computer experience every semester rather than in a single concentrated course. The series of NMR spectroscopy experiments will give each student the opportunity to operate comfortably and proficiently a laboratory workstation for acquisition, analysis, and presentation of data. The flexibility of the hardware and software allows future projects to computerize other laboratory instruments and develop similar sets of laboratory experiments.

Audrey N. Tomera	TPE-8650023
Southern Illinois University	$172,850
Carbondale, IL 62901	Earth/Ecology
	15 months

"Regional Resource Issue Infusion Project for Middle School Teachers (II)"

This project involves 32 middle school science and social studies teachers from the lower midwest. Working under a team of scientists and science educators for a period of three collegiate semesters, the participants will focus on earth science and ecological principles and on the science-related societal issues associated with geological and ecological resources in the region.

One of the strongest components of this project is the outcome related to the participants' understanding of science-related societal issues within their own geographical region. Field activities, supported by the local school systems, are an integral part of the scheduled activities. Teachers and administrators will be familiarized with the local and regional resources and will be trained in issue investigation and problem solving, thus aiding them in implementing similar instruction in their own classrooms. The project will be carried out in four phases, enabling teachers to participate in activities, carry out independent investigations, implement these activities in their classrooms and evaluate the impact of the project. Graduate credit will be given upon completion of the project.

Isaac L. Shechmeister
Southern Illinois University
Carbondale, IL 62901

TPE-8650112
$193,140
Biology
28 months

"Institute in Microbiology and Human Genetics for Biology Teachers in Southern Illinois and Adjacent State Areas"

This project will deliver in-service training in microbiology and human genetics and will offer training in science teaching strategies to support these areas.

Twenty-five high school biology teachers who need to update and improve their biological science content and instructional backgrounds will be invited to attend.

The program will consist of three phases. Phase I will be an Academic Year Program during 1986-87 and will consist of nine full-day Saturday meetings. Phase II will be an eight-week resident Summer Program during June and August of 1987. Phase III will be a 1987-88 Academic Year Program of nine full-day Saturday meetings.

A two-day meeting of all participants will be held during April of 1988 to allow participants to consult with Institute faculty and to share teacher-developed instructional materials. Two or three site visits will be made to each participant by the faculty.

Robert N. Pendergrass
Southern Illinois University
Edwardsville, IL 62026

TPE-8550066
$191,637
Computer
36 months

"Using Computers and Problem Solving to Improve Instruction in Secondary School Mathematics"

Southern Illinois University (SIU) has put together an interesting three-part project to strengthen mathematics education within the University and the greater St. Louis areas. It will offer 32 teachers of secondary school mathematics the following: (1) the opportunity to participate in a 6-week summer session which will emphasize problem solving and the appropriate use of the computer in mathematics education, (2) the necessary guidance to develop useful classroom materials for the teaching of mathematics and computer science, and (3) the resources of the University in establishing a support network through the creation of a mathematics resource center.

Participants will have a sufficiently good background in mathematics. At least two, but no more than four, will be selected from a single school to insure peer support in the school setting. TenCo, a 10 county microcomputer consortium, has not only expressed support for this project, but has agreed to make its very large library of computer software available to the University and participants of the program.

Biweekly group meetings, patterned after the very successful meetings of the elementary school Teachers' Center Project at SIU will be held during the academic year for the purposes of exchanging information and feedback on materials and their use. Seminars will be held at both campuses of SIU, at Edwardsville and East St. Louis, to insure continued involvement of minority teachers. These meetings will serve as the basis of a local teacher "network." Group activities will include programs of interest to University faculty, participants, and their colleagues.

Paul J. Sally	MDR-8550472
Sheila Sconiers	FY 86 $204,494
University of Chicago	FY 87 $172,212
Department of Mathematics	FY 88 $165,950
5801 South Ellis	
Chicago, Illinois 60637	

"Materials and Teacher Development in Precollege Mathematics Education"

The University of Chicago School Mathematics Project is in the process of developing and implementing in the classroom a comprehensive K-12 program designed to upgrade mathematics education for all elementary school students and for the majority of secondary school students who are in the middle achievement range. An up-to-date curriculum, emphasizing problem solving and applications, is being written and tested in Chicago area schools. In its elementary (K-6) component, the project seeks to reduce the amount of time devoted to teaching computational skills, introduce more geometry and statistics, and use calculator arithmetic to aid instruction and expand the teaching of applications of mathematics.

Initial funding for the project has been provided by the Amoco Foundation. Additional funding, to assist in supporting the secondary component, has been provided by the Carnegie Foundation. NSF funding will help support the elementary component.

The project will field test the elementary school mathematics materials that are being developed, including calculator workbooks, problem solving workbooks, and workcards designed to guide students in the independent use of a variety of manipulatives. It will develop a model for the teacher training necessary to assure successful use of the developed materials. The model will focus on training generalist teachers for grades K-3 and specialist teachers for grades 4-6. A teacher training package will be prepared for use by mathematics supervisors, coordinators, and others who wish to adopt the training program.

Paul W. Grimes	CSI-8650439
Department of Economics	$17,000
Western Illinois University	Social Science
Macomb, IL 61455	30 months

"Enhanced Learning in the College Economics Curriculum through Computer Assisted Instruction"

Increasing the effectiveness of teaching through the increased utilization of computerized learning is the objective of a project being implemented in the Economics Department at Western Illinois University. A multi-user multiprocessor computer and specialized software is being used to expand and enhance the capabilities of the Department's Advanced Learning System (ALS) that provides students with a choice of the manner in which they learn. In addition, the incorporation of new analytic software packages into upper-level courses and the Honors Program is providing "hands-on" computer experience for students preparing for specific careers. Significant improvements in undergraduate instruction in economics are being implemented.

INDIANA

Presidential Awards for Excellence in Science and Mathematics Teaching

Glen Ellis
Mathematics
Valparaiso High School
Valparaiso, IN 46383

Gordon Mendenhall
Mathematics
Lawrence Central High School
Indianapolis, IN 46226

Fellowships

Indiana State University Terre Haute, IN 47809 Graduate Research Fellowships Support Grants	$16,350
Indiana University - Bloomington Bloomington, IN 47405 Graduate Research Fellowships Support Grants	$122,390
Purdue University West Lafayette, IN 47907 Graduate Research Fellowships Support Grants	$228,120

Edwin G. Cohen	MDR-8550902
Agency for Instructional Technology	FY 86 $223,768
111 West 17th Street	FY 87 $273,494
Box A	
Bloomington, IN 44702	

"Mathematics for the '80s - Math Six

The Agency for Instructional Technology, in partnership with a consortium or more than 25 state education agencies, is in the process of developing Mathematics for the '80s, a collection of high-quality video and print materials that support mathematics teaching in grades 4-6. Materials for grades 4 and 5 have already been developed. This grant will provide partial support for the development of the grade 6 materials.

The project will develop a series of eighteen 15-minute instructional television programs, together with a teacher's guide that will include worksheets for students. The series will emphasize problem-solving and applications. Consortium agencies will distribute the materials within their states, via public and non-commercial cable television transmission, for example, and they may authorize off-air recording of the television programs and duplication of print materials for educational use within their legal jurisdictions. Nonconsortium agencies will offered an opportunity to contract with the Agency for similar rights.

Thomas R. Mertens	TPE-8550925
Jon R. Hendrix	$129,275
Ball State University	Biology
Muncie, Indiana 47306	18 months

"Using a National Network to Develop Leadership Skills for Implementing Human Genetics and Bioethical Decision-Making in Secondary School Biology Classrooms"

This Leadership Activities project will provide enhancement and professional development experiences for 40 outstanding biology teachers nationwide. Former NSF Honors Workshop participants will help to identify the Summer 1986 participants through a thorough selection process. Documentation of the individual participant's entering knowledge and the competencies developed through project activities will contribute to the overall project evaluation. Upon completion of the project, the participants will become eligible for membership in the National Network to Implement Human Genetics and Bioethics education. The project's four week summer component will be offered at Ball State University and will be followed by an academic year component designed to assist participants in achieving project goals.

The overall goals will provide the participants with renewal and updating in human genetics and bioethics education, use Network teachers to implement inservice workshops that will disseminate knowledge and instructional materials to peers of the 1986 participants, and to evaluate the impact of the National Network in implementing project goals.

Susan M. Johnson	TPE-8652001
Mildred T. Ballou	FY 86 $107,382
Ball State University	FY 87 $ 82,159
Muncie, IN 47306	12 months

"Science for Every Elementary School Child: The Ball State University/Ft. Wayne Plan"

This Leadership Activities project will increase the science and the teaching competence of 80 public and private school teachers of grades K-5 in the Fort Wayne area. The project's principal goals include developing and assessing a model for increasing the quality and quantity of science taught by all regular elementary school teachers within a school district. The teacher education will occur within an investigative context; the teachers will receive support in consultation while they incorporate investigative science activities in their own classrooms; subsequently the lead teachers will work with the other teachers within their buildings and reach into all classrooms in the 36 elementary schools in the Fort Wayne community school system and in the Lutheran private school system. A team of 2 excellent teachers, one from grades K-3 and one from grades 4-5, will serve as catalysts for the improvement of science teaching within each school.

The project is based upon a needs assessment, pilot study, and recommendations from the science education literature. The model includes significant cost sharing and partnerships with the cooperating school district, the university, and local industry. The leadership team includes scientists, science educators, and school administrators. The model includes the development and support of plans and programs designed to sustain the results of this project well beyond the period of funding from NSF. Plans are also underway for thorough documentation and the dissemination of results. The project includes summer activities involving academic work in science and in curriculum development and a series of activities throughout the academic year that build upon these summer activities. The model also includes special workshops conducted for administrators working with the teachers in their schools.

Wilmer J. Stratton	CSI-8650778
Department of Chemistry	$14,995
Earlham College	Inter & Multidiscipl.
Richmond, IN 47374	30 months

"Multidisciplinary Use of High Performance Liquid Chromatography"

The introduction of high performance liquid chromatography (HPLC) into biology and chemistry laboratory courses (with a limited introduction into psychology) is being accomplished through the modular upgrading and computerization of an existing high performance liquid chromatograph at Earlham College. The recent acquisitions of an isocratic pump plus a gradient solvent delivery system, two detectors (variable wavelength UV and refractive index), a recorder and a microcomputer-based data acquisition system and several columns for general purpose and specialty use allows assembly, with the existing HPLC, of three complete systems in a variety of configurations for different applications. Students from the Departments of Chemistry, Biology and Psychology are being exposed to significantly improved laboratory experiences in an interdisciplinary mode. Seven courses are affected, as well as student research in all three departments.

Donald D. Snyder	CSI-8650240
Department of Physics	$19,403
Indiana University-South Bend	Physics
South Bend, IN 46634	30 months

"Laboratory Equipment for Introductory Physics and Astronomy"

The Physics Department at Indiana University at South Bend will improve its laboratory program and provide its students hands-on experience with laboratory equipment which is so much a part of a scientist's life. In order to offer a more effective and up-to-date program, the Department will purchase equipment in three specific areas:

1) Computerization of the introductory physics laboratories;
2) Utilization of telescopes and accessories in astronomy courses; and
3) Creation of a modest intermediate-level (mostly modern) physics laboratory.

The equipment will provide both physics majors and non-majors worthwhile laboratory experiences and help develop the excitement needed for learning and self-discovery beyond the classroom.

Howard G. Adams	ENG-8612598
National Consortium for Graduate Degrees for Minorities in Engineering, Inc. (GEM)	$50,000
Notre Dame, Indiana 46556	12 months

"Journey: Exploration in Science and Engineering"

GEM together with NAK Productions, proposes to produce a pilot program for a television series entitled, "Journey: Exploration in Science and Engineering." This program will be developed in magazine format and will be used to motivate and explore with 13 to 18 year-old students the excitement emerging from today's technological career fields. This age group is a priority audience for NSF. Both GEM and NAK Productions have excellent qualifications to undertake this effort, which is expected to reach 50 million people. This program will be distributed nationally over PBS and The Learning Channel and will be used in schools and at national conferences and workshops. Supplementary printed materials for students and teachers will be developed.

Howard G. Adams	RCD-8650067
National Consortium for Graduate Degrees for Minorities in Engineering, Inc. (GEM)	$49,194
Notre Dame, Indiana 46556	12 months

"Opportunities for Minority Students in Graduate Education: Science and Engineering"

This proposal addresses the national problem of under-representation of American Indians, Black Americans, Mexican Americans and Puerto Ricans in science and engineering graduate programs.

The project consists of a series of one-day conferences on graduate study in science and engineering for minority students, their counselors and graduate school recruiters. The conferences were held at nine sites: Boston, New York, Washington (DC), Seattle, Atlanta, Houston, Los Angeles, San Francisco, and Chicago. Each conference was held on the campus of a GEM-member with the university serving as a co-sponsor.

The goals of the conferences were: 1) to present accurate information on opportunities for minority syudents in graduate study in science and engineering; 2) to encourage undecided minority students to seriously consider graduate study; 3) to offer opportunities for dialogue between the students and minority men and women currently engaged in graduate study; and 4) to introduce students to the wide range of national financial support programs available for graduate study.

Approximately 900 students and 100 counselors, recruiters, university faculty and representatives from related organizations (ETS, etc.) attended the conferences. A report of conference activities will be distributed to a variety of colleges and universities for use in future counseling and recruitment activities.

Jane Butler Kahle	MDR-8470523
Purdue University	FY 86 $41,672
Department of Biological Science Education	FY 87 $62,678
West Lafayette, IN 47907	FY 88 $72,122

"Science Education for Rural Girls: Educational Equity Through Master Teaching"

This project builds upon recent work which identified instructional strategies and teaching behaviors which affect the retention of both boys and girls in science courses and careers. The primary purpose of this work is to develop an intervention program which will encourage more girls (as well as boys) to enroll in advanced science and mathematics courses and to promote their interest in scientific careers. To achieve that purpose, five groups will be involved in the intervention program: secondary school biology teachers, students, parents, community and industrial volunteers, and science education researchers.

The project will proceed through five stages. A preliminary study will determine the needs of rural biology students, the utility of various intervention materials, and the validity and reliability of selected assessment instruments. Rural biology teachers will be recruited to participate. Next, the selected intervention teachers will participate in a two-week, intensive workshop, conducted by master teachers, to develop a prototype intervention packet and to preview and evaluate commercially available materials. The fourth phase of the project will be actual implementation of the intervention programs in rural high schools. Finally, the evaluation phase of the project will assess the effectiveness of the program and develop an intervention packet suitable for wide and diverse dissemination.

James D. Lehman	TPE-8650056
Purdue University	$36,253
West Lafayette, IN 47907	Biology
	15 months

"Program for Integration of Advanced Technology in Elementary Teacher Preparation"

The intent of this project is to establish a model program for the integration of advanced technology in a preparatory biology course for preservice elementary teachers. The program seeks to improve the basic biology instruction provided to preservice elementary teachers, provide examples of the use of a variety of advanced technologies in elementary science teaching, and to involve preservice elementary teachers in the development and use of computer-based teaching materials for elementary science instruction.

To achieve these goals, a variety of advanced technologies will be carefully integrated into the curriculum of a two-semester biology course serving about 200 preservice elementary teachers at Purdue University. Students' knowledge and attitudes will be assessed throughout the project by comparing sections receiving technology-enhanced instruction with those receiving "normal" instruction.

This project focuses on issues important to the National Science Foundation and to Science Education. It represents a bold step in the direction of computer integration into content courses and through the many "hands-on" activities, and should result in teacher familiarity with computers and use of computers in teaching elementary science.

Gerald H. Krockover	TPE-8550912
Purdue University	FY 86 $137,497
West Lafayette, IN 47907	FY 87 $164,286
	Atmospheric
	12 months

"Atmospheric Science Education Program for Teachers (Grades 5-9)"

The Atmospheric Science Education Program for Teachers of Grades 5-9 is designed to improve the Atmospheric Science background of 24 Indiana teachers utilizing eight atmospheric science topics. Teachers will spend four weeks in residence at the Purdue University, West Lafayette campus.

Participants will spend a considerable amount of time in the field and will be furnished with a set of basic materials that they will keep and take back to their classrooms.

The project staff will conduct considerable follow-up in the classroom for the purposes of providing expert resources to the participants and to assess the implementation of the atmospheric science topics into the curriculum. An extensive evaluation process will determine the impact of this project.

Warren W. Bowden	CSI-8650836
Department of Chemical Engineering	$6,800
Rose-Hulman Institute of Technology	Engineering
Terre Haute, IN 47803	30 months

"Chemical Engineering Laboratory Improvement Project"

Through this project, equipment for experiments in thermodynamics, gas diffusion, liquid-liquid extraction and gas absorption significantly improves laboratory instruction in chemical engineering at Rose-Hulman Institute. This equipment gives students experience with automated control of process equipment, with improved data acquisition, and with modern computer control and data logging equipment and techniques.

Ira Franklin Jones	CSI-8650849
Department of Chemistry	$12,390
Tri-State University	Chemistry
Angola, IN 46703	30 months

"Atomic Absorption Spectrophotometry for Undergraduate Science and Engineering"

The aim of this project is to incorporate atomic absorption spectrophotometry (AA) into undergraduate science and engineering curricula at Tri-State University. An AA system will be used jointly by chemistry, biology, and engineering programs to improve instrumentation-based laboratory instruction and to provide students with the experimental capabilities afforded by modern instrumentation. The equipment will provide analytical capability and training in several interrelated areas:

1. Students in chemistry, chemical engineering, materials science, metallurgy, biology, and toxicology will have experience with AA, including theory, instrumental design, operation, and analytical applications.

2. Biology students will use the extended capabilities provided by AA to analyze heavy metals in tissues and in environmental samples.

3. Student projects and research in water quality in the northeastern Indiana lakes region will be expanded to include trace element analysis, thus adding considerably to the scope of information obtained.

IOWA

Presidential Awards for Excellence in Science and Mathematics Teaching

Ross L. Iverson
Science
Miller Junior High School
Marshalltown, IA 50158

Christopher R. Olse
Mathematics
George Washington Senior High School
Cedar Rapids, IA 52402

Fellowships

Iowa State University of Science & Technology Ames, IA 50011 Graduate Research Fellowships Support Grants	$51,870
University of Iowa Iowa City, IA 52242 Graduate Research Fellowships Support Grants	$13,580

Karen A. Dotseth
Cedar Falls Sr. High School
Cedar Falls, IA 50613

TPE-8550963
$174,388
Mathematics
30 months

"In-Service Training and Active Research: Teaching Problem- Solving Skills in Mathematics and Science"

This project will design, implement, and disseminate in-service training to 67 teachers of grades K-12. The program will upgrade the teaching and learning of problem-solving processes and skills. The Cedar Falls school district is ideal for the development of a model program: there are only six elementary schools, two junior high schools and one high school in the district, so all teachers can be involved in the program.

During the summer of 1986, 26 teachers will attend a four-week workshop. The principals will attend five of the workshop sessions. During the summer of 1987, a second group of teachers will attend the summer workshop.

During each semester of the following academic year, there will be four days of released time for in-service work with teachers and teaching. The participating teachers will be expected to teach problem-solving skills as a regular, systematic part of their daily classroom instruction. In addition, each of the participating teachers will be required to conduct an action research project in conjunction with their teaching. The Project Team will provide consultive help in the various classrooms.

Conrad Weiffenbach
Department of Physics
Cornell College
Mount Vernon, IA 52314

CSI-8650332
$8,367
Physics
30 months

"A Computer-Based Pulse-Height Analyzer and Counting Electronics for Undergraduate Instruction in Physics"

The physics department at Cornell College will acquire instruments and apparatus for computer-based data acquisition and analysis to modernize the laboratory curriculum for physics majors. The instruments will:

o Replace a worn-out pulse-height analyzer from the 1960's with a computer-based system with a plug-in analyzer board.

o Replace some nuclear pulse electronics modules with new ones having increased capabilities. The new circuits will be used to introduce an experiment measuring the lifetime of cosmic-ray produced muons. In this experiment, as in several others, the computer acting as a pulse-height analyzer will be helpful in data reduction.

o Add a general-purpose laboratory computer with a high-speed analog/digital interface, a plotter, diskette storage of data, and software for data reduction and preparation of graphs. This laboratory computer will have immediate application with experiments in acoustic resonance with transient excitation and fast Fourier transform analysis of audio frequency signals, data logging in quantitative measurements of optical diffraction patterns, and data logging with an infrared spectrometer.

David Robinson	TPE-8552378
Drake University	$71,782
Des Moines, IA 50311	Physical
	18 months

"Physical Science Workshop for Teachers of Grades 7-9"

This project funds a six-week summer Physical Science Workshop for teachers of grades 7-9. The workshop will be an opportunity for 24 teachers from an 11-county area of Central Iowa to participate in an in-depth program to update their skills.

The workshop will do the following: (a) update knowledge of participants in physical science, (b) advance skills in physical science instruction and experimentation, (c) prepare diverse curriculum materials that cover a complete physical science course and (d) make equipment for schools which have a minimal quantity of laboratory materials.

During the academic year, the participants will meet for post-sessions with the workshop staff, principals of participating schools, and science consultants to discuss progress and problems in implementing the workshop concepts and materials. The workshop staff will visit each teacher's local school to assist in implementing new materials.

Bruce A. Voyles	CSI-8650417
Department of Biology	$12,750
Grinnell College	Biology
Grinnell, IA 50112	30 months

"Liquid Scintillation Spectrometry in Biology and Biochemistry"

With the funds conveyed in this award, the Biology and Chemistry Departments of Grinnell College are purchasing a liquid scintillation spectrometer to permit the use of radioisotopes and liquid scintillation spectrometry in the laboratories of the Cell Biology, Microbiology, Genetics, Plant Physiology and Biochemistry courses. Liquid scintillation spectrometry is a powerful analytical tool for the characterization of proteins and other complex compounds of biological interest through its ability to detect very low levels of beta radiation. The technique has numerous applications in cellular/molecular biology and biochemistry--synthesis of cell products, metabolic pathways, etc. The new instrument also will enhance significantly the ability of advanced students in the two departments to conduct independent research in cellular biology and biochemistry.

Thomas J. Brozoski	CSI-8650950
Department of Psychology	$40,000
Grinnell College	Psychology
Grinnell, IA 50112	30 months

"Optical Pattern and Motion Analysis: Applications in Experimental Psychology"

The most fundamental of experimental psychology's foundations is the quantitative measurement of behavior. Recent improvements in intelligent instrumentation have made systems for quantitative image and motion analysis commercially available. The more sophisticated of these instruments enable rapid high-resolution quantification of multiple moving objects. At the same time a host of laboratory problems in experimental psychology require the accurate quantification of behaviors that can be measured readily by optical means. Examples are the coordinated movement of a limb as it is affected by maturational changes; the locomotor sequence of test animals as they are affected by stimulant drugs; the interactive dynamics of children in a preschool classroom as they are affected by varieties of play activities; the exact location and volume of brain lesions as they relate to observed behavioral changes. A single high-quality quantitative image and motion analysis instrument is being applied in a wide range of laboratory problems similar to these.

The major objectives are three-fold: a) immediately enhancing the rigor of existing lab work in several advanced courses as well as ongoing student-faculty research projects; b) improving the variety and quantitative rigor of laboratory work in the majority of second, third, and fourth-level laboratory courses; c) developing a library of instructional applications, as well as a library of applications software, for quantitative image analysis. Quantitative image and motion analysis provides a quantum methodological advance for experimental psychologists in that it confers the capability to measure unobtrusively and simultaneously multiple dimensions of the behavior of multiple organisms. This project brings a state-of-the-art instrument into undergraduate laboratories in a way that invigorates a set of upper division courses. The novel applications this faculty has designed have the potential of serving as a model for other high quality undergraduate psychology programs.

Lynn W. Glass
Iowa State University of Science
 and Technology
Ames, IA 50011

TPE-8651569
$54,273
Chemistry
20 months

"Improvement of Chemistry Teaching in Central Iowa Through the Use of Integrated Microcomputer Learning Activities"

This Leadership Activities project will provide enhancement and professional development experiences in the use of the computer as an instructional tool for 25 chemistry teachers in central Iowa. The goals of the project are to upgrade the knowledge of basic and applied chemistry of the teachers, to assist them in effectively utilizing the microcomputer in teaching chemistry, and in developing 25 microcomputer lessons which augment their existing chemistry curricula. These 25 teachers will subsequently provide in-service activities to other chemistry teachers in their geographic area utilizing the skills and knowledge attained.

The network of 25 chemistry teachers currently exists. They have been actively involved in the planning for this project. The group will meet for six Saturday sessions during the 1986-87 academic year and for two weeks during the summer of 1987. The teachers will be supported by a science educator, a college computing specialist, a research chemist, and a 1984 Presidential Awardee in Science (Chemistry). Follow-up visits will be made by the staff to the teachers in their schools. The activities in which teachers are engaged will range from lectures and laboratories to interactions with computers. Active participation is assured, and there will be frequent referencing of activities to the high school chemistry curriculum.

John Tjostem	CSI-8650211
Department of Biology	$18,875
Luther College	Biology
Decorah, IA 52101	30 months

"Acquisition of a Transmission Electron Microscope to Initiate Biological Electron Microscopy at Luther College"

Through this project, Luther College will procure a transmission electron microscope (TEM) so that its Biology Department can expand course offerings to include a course in the biological applications of electron microscopy. Students in Cell Biology and Molecular Biology courses will benefit from a more balanced presentation of structure and function. The additional emphasis on cell structure will result in an improved frame of reference upon which to comprehend cell function. Histology students will gain a better understanding of cell fine structure. This project will upgrade graduate school preparation for biology majors and produce improved technical employment possibilities for graduating seniors. The skill of electron microscopy is a highly sought-after expertise in research and industry.

The TEM will be used to increase awareness of cellular biology at the introductory level. Students in General Biology will receive a closely supervised first-hand experience of taking electron micrographs which will serve as lab material for the study of cell fine structure. The Chemistry Instrumentation course also will include the electron microscope among the instruments studied, and time on the electron microscope will be made available for student research in geology. This instrument thus will benefit the curricula of three of Luther College's science departments.

Roy D. Unruh	TPE-8554457
University of Northern Iowa	$178,146
Cedar Falls, IA 50613	Physics
	12 months

"Physics Resources and Instructional Strategies and Content Workshops"

This proposal describes two three-week workshops for 30 teachers each to be held during the summer of 1986. Teachers from Iowa and throughout the upper midwest who are minimally prepared to teach high school physics, but who are scheduled to do so, will be selected. The workshops will provide teachers with content background in physics as well as training in teaching strategies. Resource and instructional strategies materials created and field tested by the Iowa Physics Task Force for high school physics teachers will be used. Master teachers from Iowa will assist in the workshops, aiding participants with subject matter as well as classroom techniques.

A very interesting set of follow-up activities should insure the implementation of an improved teaching/learning environment in the physics classes of these teachers. Conference calls on a regular basis will maintain a close relationship among the participants and the project staff. Videotaping of physics lessons will be carried out every nine weeks by participants. These tapes will be critiqued by project staff and returned with comments and suggestions. On-site visits will be conducted by project staff to personally observe the classes.

KANSAS

Presidential Awards for Excellence in Science and Mathematics Teaching

Rose F. Buschman
Mathematics
Garden City High School
Garden City, KS 67846

Greg Schell
Science
Queen of the Holy Rosary
Overland Park, KS 66204

Fellowships

Kansas State University Manhattan, KS 66506 Graduate Research Fellowships Support Grants	$32,700
University of Kansas - Main Campus Lawrence, KS 66045 Graduate Research Fellowships Support Grants	$56,600

Janice S. Barton	CSI-8650399
Department of Chemistry	$34,624
Washburn University of Topeka	Inter & Multidiscipl.
Topeka, KS 66621	30 months

"Modernization of Chromatographic and Electrophoretic Instrumentation in Biology and Chemistry"

The recent acquisition of high performance liquid chromatography, gas chromatography, and electrophoresis instrumentation together with appropriate computer interface systems is being used to improve undergraduate laboratory instruction in fifteen courses in the Departments of Biology and Chemistry. In addition, the instrumentation is being used extensively in individual student research projects. This allows students from these departments to become familiar with the use and applications of modern chromatographic and electrophoretic instrumentation, including the increased efficiency of data collection and analysis which can be accomplished through computer interfacing.

Barbara Bowman	TPE-8651522
Wichita State University	$248,049
Wichita, KS 67208	Botany/Earth/Physics
	16 months

"Summer Science and Instructional Methods Courses for Elementary and Middle School Science Teachers"

This project will provide 120 elementary and 100 middle school teachers with four weeks of concentrated science course work and science methods instruction during the summer of 1987. The emphasis at the elementary school level will be to build teacher confidence and content knowledge in the following science areas: Botany, Earth Science, and Physics--heat and pressure physics, and sound waves and simple harmonics. The emphasis at the middle school level will be to introduce a variety of student-oriented teaching strategies to be used with typical middle level curricula covering the content areas of Earth and Space Science, Chemical Concepts, Physical Concepts, and Life Science. All teachers will also be involved in four follow-up sessions during the 1987-88 Academic Year.

During the four-week experience, teachers will attend content presentations in the morning followed by a directly-related methods presentation in the afternoon. In addition to mastering the content, each teacher will be expected to develop a lesson plan each day to be used upon his/her return to the classroom.

KENTUCKY

Presidential Awards for Excellence in Science and Mathematics Teaching

James R. Moore
Mathematics
Danville High School
Danville, KY 40422

Thomas H. Peterson
Science
Oldham County High School
Buckner, KY 40010

Fellowships

University of Louisville Louisville, KY 40292 Minority Graduate Research Fellowships Support Grants	$16,350

Wesley L. Shoop	CSI-8650946
Department of Biological Sciences	$31,817
Murray State University	Biology
Murray, KY 42071	30 months

"Interfacing Scanning Electron Microscopy with Traditional Light Microscopy and Microtechniques in an Undergraduate Curriculum"

This project involves the development of a new course that interfaces the theory and practice of scanning electron microscopy with a traditional "Light Microscopy and Microtechnique" course. Electron microscopy is a common tool used in industry and postgraduate research, and yet is rarely presented in an undergraduate curriculum. The new course, entitled "Scientific Methods Using Scanning Electron Microscopy", allows upper-division undergraduates to be exposed to this state-of-the-art technology. The course is directed at students from a variety of disciplines and is cross-listed under the Departments of Biological Science, Chemistry, Engineering, Geoscience, and Physics. The scanning electron microscope (SEM) acquired through this award serves as the focus of the didactic aspects of this project which include the theory of electron microscopy and ultrastructure interpretation. Other basic skills that are emphasized include data generation, gathering, analysis, and presentation.

Before students enter the course, each is asked to submit a project proposal from any field or discipline on any topic--as long as an SEM is part of the methology used to study the problem. The first three weeks of the course are devoted to the theory of electron microscopy, and are designed to give the student a working knowledge of the instrument. After a rigorous check-out at the end of week three, the student is given wide latitude in the pursuit of individual projects. Weeks four to the end of the semester are devoted to the interpretation and presentation of data. Completed projects must be submitted in the form of a scientific paper, and also as a 10-minute oral presentation.

James Swartz	CSI-8650334
Department of Chemistry	$16,387
Thomas More College	Chemistry
Crestview Hills, KY 41017	30 months

"Enhancement of the Chemistry Curriculum by Fourier Transform Infrared Spectrophotometry"

This project will improve significantly the chemistry laboratory curriculum by giving students relevant instruction and hands-on experience with a modern state-of-the-art Fourier transform infrared spectrophotometer (FT-IR). Also students will have a first-hand opportunity to use computer-controlled data manipulation and collection techniques. The project will allow students to investigate, identify, and characterize the structures of unknown compounds and compounds which they synthesize. The computer and associated software will permit students to control the instrument and select methods of data collection, storage, search, and manipulation. The project will be implemented by expansion of current experiments and development and/or incorporation of new experiments. The FT-IR will be used in Organic Chemistry Laboratory, Techniques of Dynamics, Chemical Instrumentation, Inorganic Synthesis and Characterization, Instrumental Analysis, and Senior Research Experience. Enhancement of student laboratory experience through the operation of a computer-controlled FT-IR will provide students with a better, more relevant preparation for continued study in graduate school and for careers in industrial laboratories.

Kenneth Mussnug	CSI-8650802
Dept. of Industrial & Engineering Tech.	$23,724
Western Kentucky University	Engineering
Bowling Green, KY 42010	30 months

"Establishment of a Flexible Manufacturing Cell at Western Kentucky University"

The instructional focus of the industrial technology program in the Department of Industrial and Engineering Technology at Western Kentucky University has been reorganized from that of traditional production techniques to one of complete Computer Integrated Manufacturing Technology (CIMT). With the acquisition of a materials handling robot, a flexible manufacturing cell (FMC) has been added which completes the laboratory facility. The availability of the FMC allows undergraduates to use computer assisted techniques and robotics to evaluate flexible manufacturing methodology and to apply standard production techniques to experiments leading to the production of high quality, marketable products.

Robert D. Hoyt	CSI-8650346
Ogden College of Science & Technology	$44,443
Western Kentucky University	Inter & Multidiscipl.
Bowling Green, KY 42101	30 months

"The Multi-Disciplinary Use of X-Ray Fluorescence Spectroscopy"

Laboratory instructional capabilities are being expanded and improved by the recent acquisition of an Energy Dispersive X-ray Fluorescence Spectrophotometer (EDXRF). This instrument provides rapid, multi-elemental analytical capabilities (qualitative and quantitative), non-destructive sample treatment, high sensitivity, and the ability to analyze small samples. Eleven new laboratory exercises are being developed, and five existing laboratory courses are being expanded in the departments of Agriculture, Biology, Chemistry, Geography and Geology, and Physics and Astronomy. A broad array of independent study topics is now possible in these departments and also in the Departments of Allied Health, Health and Safety, and Industrial and Engineering Technology.

LOUISIANA

Presidential Awards for Excellence in Science and Mathematics Teaching

Joyce B. Patton
Science
Caddo Parish Middle Magnet School
Shreveport, LA 71106

Evelyn Sisco
Mathematics
Pineville High School
Pineville, LA 71360

Fellowships

Louisiana State University Systems Office Baton Rouge, LA 70803 Minority Graduate Research Fellowships Support Grants	$9,750
Tulane University New Orleans, LA 70118 Graduate Research Fellowship Support Grants	$25,825

Jethro Terrell
Department of Physics
Grambling State University
Grambling, LA 71245

CSI-8651089
$18,876
Physics
30 months

"Equipment to Upgrade Physical Optics, Atomic and Nuclear Physics Laboratories"

This project will improve and strengthen optics, atomic, and nuclear physics laboratory experiments currently offered to undergraduate physics majors. In this program, three existing experiments will be upgraded, and five new optics experiments and one new experiment each from atomic and nuclear physics will be added. Students will be introduced to methods and techniques used in the fields of lasers, optics, electro-optics, atomic and nuclear physics. The project objectives are achieved by providing hands-on experiences with state-of-the-art instrumentation. The project will improve the quality of instruction, stimulate student interest and provide opportunities for junior and senior level research projects.

Hunter A. McAllister
Department of Psychology
Southeastern Louisiana University
Hammond, LA 70402

CSI-8650522
$19,661
Psychology
30 months

"Equipment to Establish a Microcomputer-Interfaced Laboratory for Teaching Psychology to Undergraduates"

The aim of this project is to establish a microcomputer laboratory in psychology in order to improve undergraduate students' research experiences. Due to the large number of students and the relatively small number of faculty members it has not been possible to give undergraduate students at Southeastern Louisiana University research experiences that they require if they are to gain an accurate appreciation of how research is conducted in psychology.

There are two aspects to this project -- one for students in lower level psychology courses and one for students at the upper level. In the lower level courses, commercially available software packages allow students to conduct replications of some of the classic experiments in this discipline. In the upper level courses, microcomputers are being used in original research projects involving precise measurement and control. Many of the projects involve interfacing the microcomputer with experimental equipment already existing in the department. Students are introduced in the intermediate program to the process of delimiting questions, posing falsifiable hypotheses and designing tests of their validity. More advanced students are able to conduct individual research studies or to participate in faculty projects.

MAINE

Presidential Awards for Excellence in Science and Mathematics Teaching

Allen G. Gerry
Mathematics
Oxford Hills High School
South Paris, ME 04281

Richard N. Lord, Jr.
Science
Presque Isle High School
Presque Isle, ME 04769

Fellowships

University Maine - Orono Orono, ME 04469 Graduate Research Fellowships Support Grants	$11,590

R. Blake Whitaker	CSI-8650281
Department of Biology	$21,296
Bates College	Biology
Lewiston, ME 04240	30 months

"Instrumentation for New Cellular and Molecular Biology Course"

The goal of this project is to equip the laboratory for a new, required course in Cellular and Molecular Biology. This course has been moved to the college's unique Spring Short Term to allow improvement and expansion of the laboratory experience afforded the students. (During this Spring Term, Bates students immerse themselves in a single course. This scheduling permits longer, more open-ended laboratory experiences than are possible to fit into the normal laboratory period of three or four hours.) The new equipment also will allow more individualized student instruction in such basic techniques as cell fractionation, electrophoresis, column chromatography, enzymology, and cell culturing. The improvements made through this award are expected to strengthen significantly the technical skills of students in this course, and to have a major secondary effect on the advanced laboratory electives currently taught in the Department. Instruments procured through the award include ultracentrifuges, a 12-port filtering manifold, tissue culture and cell harvesting apparati, electrophoresis equipment, fraction collectors and other chromatography instruments.

John W. Creasy	CSI-8650268
Department of Geology	$14,484
Bates College	Earth Sciences
Lewiston, ME 04240	30 months

"Addition of Gravity Studies to the Geology Curriculum"

The problem-oriented geology curriculum at Bates College, emphasizing quantitative field-based inquiry, is being improved significantly by the recent acquisition of gravity surveying equipment. Student experiences with problem-oriented, quantitative investigations begin in the introductory courses and continue through the required two-semester senior thesis. The additional instrumentation expands research opportunities for students to explore questions of crustal structure (e.g. the subsurface shape of plutons or the location and kinematics of faults). Students at various levels of instruction become familiar with the basic principles of gravity, the geologic applications of gravity studies, the procedure for conducting a gravity survey, the quantitative reduction of gravity observations, and 2- and 3-dimensional modeling of gravity data.

John E. Kelsey	CSI-8650267
Department of Psychology	$18,249
Bates College	Psychology
Lewiston, ME 04240	30 months

"Biopsychology: Laboratory Apparatus for Discovering Its Principles and Techniques"

This project provides equipment to enhance the research experience of the approximately 85 students who take courses or do independent research in biopsychology each year. Acquisition of sufficient laboratory equipment enables Bates students to gain the hands-on experience that is essential for a thorough understanding of this rapidly growing field. Through the new laboratory equipment, students develop new research techniques, perfect previously acquired skills and, equally importantly, discover for themselves the major principles of biopsychology. Stereotaxes, a microtome, electrical stimulators, and oscilloscopes facilitate the acquisition of physiological skills associated with small animal (rat) neurosurgery, histology, and electrical self-stimulation. To enhance students' capacity to do sophisticated animal behavioral research, operant chambers and microprocessors with which the chambers can be interfaced are being installed in the teaching laboratory.

MARYLAND

Presidential Awards for Excellence in Science and Mathematics Teaching

George M. Radcliffe
Science
Mace's Lane Middle School
Cambridge, MD 21613

Sharon R. Whitt
Mathematics
Anne Arundel County Learning Center
Annapolis, MD 21401

Fellowships

Individual Awards for Foreign Tenure Graduate Research Fellowship	$17,100
Johns Hopkins University Baltimore, MD 21218 Graduate Research Fellowships Support Grants	$458,130
University of Maryland - Baltimore County Catonsville, MD 21228 Minority Graduate Research Fellowship Support Grants	$33,450
University of Maryland - College Park College Park, MD 20742 Graduate Research Fellowships Support Grants	$65,400

Jack M. Wilson	TPE-8651546
American Associate of Physics Teachers	$34,300
College Park, MD 20740	Physics
	18 months

"Inter-American Conference on Physics Education"

The purpose of this project is to foster inter-American cooperation for the improvement of physics instruction through the development of local and multinational networks. These networks will take shape at an Inter-American Conference on Physics Education which is to be held in Mexico in July, 1987.

As a result of the conference, topical network groups will be formed within the United States to become the links between the conference and existing national networks. These groups, composed of leading physics educators, most of whom will have attended the Conference, will meet after the conference to initiate new networks or strengthen existing ones based on the topical areas identified by the conference participants. The areas targeted for action may include such special topics as: Educational Research in Physics, Teaching Modern Physics, Linking Physics and Technology in the Classroom and Encouraging Laboratory Work and Low-Cost Experimentation.

The project will emphasize problems of physics education in the countries of the Americas--Latin America, the Caribbean, the United States and Canada. Pooling of ideas from all the Americas, discussion of experiences, and examination of solutions to problems will be beneficial to all participating countries inspite of differences among their educational systems. Communication networks established for conference purposes as well as those created informally among participants should lead to useful forms of regional or hemispheric cooperation.

Donald F. Kirwan	TPE-8554596
Jack M. Wilson	$437,840
American Association of Physics Teachers	Physics
College Park, MD 20740	18 months

"Leadership Development of Physics Teaching Resource Agents"

This grant provides support for continuation and further development of a program of the American Association of Physics Teachers (AAPT) which developed a nationwide cadre of Physics Teaching Resource Agents. Project staff will again recruit outstanding high school physics teachers whose classroom practice has been judged to be exemplary and effective. Subsequently, these resource teachers will participate in a series of workshops dealing with strategy, techniques, content, and technological innovation which have been tested and validated by the AAPT. The participants will also develop skills in conducting their own workshops for colleagues in their own regions of the United States.

The AAPT will provide follow-up support for the local workshops with resource personnel, limited amounts of funding and materials, and the loan of laboratory equipment and computers. It is anticipated that approximately 100 physics resource teachers will participate in the workshops, each reaching out to approximately 60 more teachers. Thus, the workshop may ultimately influence approximately 6,000 teachers. In 1985, 100 teachers participated in the program and by March 15, 1986, 203 workshops involving 3,370 participants had been conducted with additional workshops planned for the spring of that year.

Three national meetings of the Physics Resource Teachers are planned. Attendance at two of these meetings will be supported by the National Science Foundation while support to attend the third meeting will energetically be sought by AAPT project staff from external sources. Participants have been quite effective in their first year in acquiring external support, and these efforts will continue to be promoted. It is anticipated that this program can become self-sustaining.

Jack M. Wilson	TPE-8652092
American Association of Physics Teachers	$36,000
Washington, DC	Physics
	12 months

"Support of Participants to the International Conference on Physics Education, Tokyo, Japan"

The project will support the attendance of 20 physics educators (6-8 college and university physicists and 12-14 high school physics teachers) at the International Conference on Trends in Physics Education, to be held in Tokyo, Japan, August 24-29, 1986. The conference will primarily be concerned with: (1) problems of classroom implementation of the results of recent research in physics education, (2) the impact of technology on physics teaching, and (3) the problem of motivating students to the study of physics. These problems will be considered at both the secondary school and the introductory undergraduate levels. The Conference is the first of its kind in the Far East, and a large fraction of the participants are expected to be physics teachers at the high school level.

The intent of the project is for U.S. Physics educators to share ideas and gain new insights about physics teaching from International colleagues. These insights will be disseminated to other physics educators in the U.S., especially those involved with curriculum development.

Participants will be required to develop specific reports based upon their involvement at the International Conference. A major topic of concern will be assigned to each participant as a primary theme for the report. Topics will be under two major categories: (1) How is modern physics integrated into the curriculum in other countries? (2) How have other countries designed teacher support and intervention programs? The participants will reassemble in Jaunary 1987, in San Francisco to present these reports at the annual joint meeting of the American Physical Society and the American Association of Physics Teachers (AAPT). Specific reports will be made to Physics Teaching Resource Agents, and to the Modern Physics Curriculum Improvement Group.

Following these sessions, selected participants will be prepared for working with the same groups in June 1987, to implement ideas for improvements gleaned from the reports. The Modern Physics Curriculum Improvement Group is already developing curriculum materials for physics teaching in high schools and introductory college courses. The input from the International Conference participants is likely to lead to significant changes based upon specific reports. Also, the reports will be published in the AAPT Announcer and in The Physics Teacher.

Sharron Smith	CSI-8651031
Dept. of Chemistry/Physics & Astronomy	$8,235
Hood College	Inter & Multidiscipl.
Frederick, MD 21701	30 months

"Improving the Chromatographic Components of Cell Biology and Biochemistry Laboratories at Hood College"

Laboratory experiences in biochemistry and cell biology at Hood College are being improved significantly through the recent acquisition of a high performance liquid chromatograph (HPLC). Through the use of this instrumentation in the preparation and analysis of proteins and nucleic acids, students are developing capabilities in modern separation techniques while gaining a better appreciation of physiological processes at the molecular level.

Henry Jay Becker	SPA 86-50069
Center for Social Organization of Schools	$80,784 Computers
Johns Hopkins University	12 months
Baltimore, MD 21218	

"Analysis of the Secondary Schools Data from the Second National Survey of Instructional Uses of School Computers"

Johns Hopkins University proposes to analyze data collected in a national survey of instructional uses of school computers. The data were collected in a survey, sponsored by the U. S. Department of Education, of 2,336 schools involving mailed questionnaires to principals and up to seven teachers per school, selected according to subject matter and computer use. The study provides important descriptive and analytical data for understanding and improving how U. S. secondary schools spend scarce resources on computers for instructional uses.

The analyses that form the basis of this proposal consist of a series of reports to be produced over a 12 month period. Report topics are directly related to secondary mathematics, science, and computer education. Specific report topics include: basic descriptive data on instructional uses of school computers; differences in access, use, and perceived impact among different categories of students (i.e., male/female and above-average, average, and below-average achieving students); use of computers in mathematics classes to teach algebra, geometry, trigonometry, analysis, general math, and statistics and probability; courses in computer programming; and, a summary and interpretation of trends, problems, and opportunities for using computers in secondary school mathematics, science and computer education.

Jo Ellen Roseman School of Continuing Studies John Hopkins University Baltimore, MD 21218	TPE-8652000 $146,948 24 months

"Computers to Enhance Science Education"

This Leadership Activities project is a joint venture of the Baltimore City Public Schools and the Johns Hopkins University School of Continuing Studies. The project involves 40 middle school and 10 high school teachers in activities to increase the application of computer technology in the science classrooms of the Baltimore City schools. It is an outgrowth of a successful pilot project involving high school science teachers during 1986. The target population contains a high percentage of minority and disadvantaged students.

Two groups of 20 middle school science teachers will receive 12 days of instruction in computer awareness, operating procedures, word processing, database and spreadsheet use, software evaluation, labortory interfacing, programming, and individual project development. Teachers will have ample opportunity to "practice with feedback" and will receive follow-up coaching by a support coordinator and leader teachers after the training program. Leadership training will be provided to 10 high school and 10 middle school teachers who will provide peer support in the school setting. In addition, 15 leader teachers will develop a series of model science lessons that integrate computer technology into the present curriculum during a five-week summer session. Project staff from Johns Hopkins will also provide continuing assistance to the project teachers. Formal associations of the teachers to continue the work of the project will be established.

Participants will be selected in pairs from middle schools that feed the high schools involved in the pilot project. Criteria have been established for the selection of the middle school trainees, the leader teachers, and the curriuclum developers.

Bernard J. Weigman	CSI-8650650
Department of Computer Science	$22,775
Loyola College in Maryland	Computer Science
Baltimore, MD 21210	30 months

"A Software Development System for the Design of Microcomputer Systems"

A laboratory course on computer design for computer science and engineering science students will be improved by the addition of a pair of Tektronix microprocessor development systems. This instrument provides for the creation and editing of software in assembler, Pascal, and C languages, storage in memory, and (by interface of the instrument with the prototype) monitoring of program execution to correct hardware and software errors. Such instruments are in common use in industry so that such CAD training should be standard for laboratory courses of this type. The addition of the instruments at Loyola will greatly improve students' understanding of the relationship between computer hardware and software.

Mary B. Hyman	TPE-8550910
Maryland Academic of Sciences	$220,569
Baltimore, MD 21230	24 months

"Science Discovery: A New Approach to Preschool Science Education"

The Maryland Science Center is sponsoring Science Discovery, an approach for introducing science to 4- and 5-year-old children in a child care center environment. Four different centers, public, private, inner-city, and urban facilities, will be implementing this program in the Baltimore area. Qualified staff from the Science Center will visit each classroom once a week prepared to give a half-hour presentation to the children with the cooperation of the teachers. Once a month, teacher-training activities will be held in each of the four centers for the purpose of training the teachers in the content, skills, and methodologies necessary to insure an ongoing program. Materials and equipment necessary for implementation of the science lessons will be brought to the centers. Follow-up activities developed by teachers and staff will be provided each week so that teachers may have the teaching materials to extend the lesson.

In addition to the teacher training component and the support and resources provided by the Maryland Science Center, appropriate curriculum material will be developed by staff, teachers and science educators which will be useful at the kindergarten level as well as for preschoolers.

Frank J. Batavick	MDR-8651559
Maryland State Dept. Education	FY 86 $ 97,710
Maryland Instructional Television	FY 87 $320,820
11767 Bonita Avenue	FY 88 $450,000
Owings Mills, Maryland 21117	FY 89 $450,000

"A Science-Based Video Series for Young Children"

Maryland Instructional Television, in conjunction with the National Science Teachers Association, will use the expertise of scientists and educators and the medium of television to create an exciting science video series for children ages four through seven. The activities of the project include the identification of content, design of instructional video and ancillary print materials, and formative evaluation. Fifteen video programs will be developed, each containing two or three separate sub-programs. These will be supplemented by teacher and parent guides which will suggest activities designed to expand upon the material covered in the program.

The series content and materials will explore everyday events in the lives of young children and will integrate science and mathematics concepts, skills and application into a variety of curricular areas. The companion activities will make use of objects already in the child's world or easily accessible in the home.

This project is funded jointly with the Instructional Materials Development Program.

John H. Falk	TPE-8550580
Howard County Chamber	FY 86 $79,924
Edgewater, MD 21037	FY 87 $79,924
	12 months

"Community Science Project"

The Community Science Project is an effort to improve science education by broadening the participation of community elements in the educational process. Parents, business-industry, Chambers of Commerce, museum (and related institutions), professional and trade associations, universities, community colleges, and trade and technical schools need to expand their involvement in the total educational process, and work out strategies for sharing science education obligations and benefits. Because the resources are already in place, the project hopes to demonstrate how major changes can be effected without necessitating significant increases in educational costs. In a stepwise fashion, the project will implement and document a self-sustaining model for broadening educational representation and participation; exploiting underutilized community resources; encouraging two-way, non-altruistic interactions; and upgrading community awareness, knowledge, capabilities and attitudes in science/society/ technology areas.

The plan involves identifying sectors/organizations within Howard County that could or should be involved with science education. These groups will be contacted and their potential contributions to science education, and any needs they have that schools or other community sectors could satisfy, will be identified and documented. Needs and contributions will be matched and the Principal Investigator will arrange meetings between relevant groups, facilitate interactions, and provide technical assistance where necessary. Follow-up meetings with all sectors/organiza-tions will be arranged to determine what they have done in science education, and needs and resources lists will again be generated. The overall process of developing lists of needs and resources, matching lists, and facilitating the resulting community interactions will be continued. The program will be expanded in a stepwise fashion and will involve a grassroots effort. The staff, working out of the Howard County Chamber of Commerce, will be responsible for identifying and recruiting experts in the community, utilizing their expertise in the most cost-effective manner, documenting meticulously the interactions established, and assisting the county to develop its own strategies for maintaining the program without external funding.

Donald A. Munson	CSI-8650374
Department of Biology	$7,123
Washington College	Biology
Chestertown, MD 21620	30 months

"Fluorescent/Phase Contrast Microscopy for a Cellular and Aquatic Biology Program Focusing on Chesapeake Bay Ecology"

The rapidly expanding Biology Department of Washington College is modernizing and upgrading the portions of its curriculum concerned with cellular/molecular phenomena, i.e. its courses in Genetics, Cell Biology, Microbiology, Aquatic Biology, Cell Physiology and Biochemistry, and a new course in Immunology. Much of this advance results from new capabilities conferred through the procurement of a light microscope with phase contrast and fluoresence features obtained through this award. This new instrument permits students to actually view such features and activities as membrane receptor sites and their motility, antigen-antibody specificity, and membrane transport.

Since the Washington College Biology Department capitalizes upon its location on the Eastern Shore of Maryland to involve itself in studying the ecology of Chesapeake Bay, one important application of the new microscope is to facilitate investigations that distinguish heterotrophic from autotrophic protozoa in mixed, naturally occurring populations. This award is an especially timely one for Washington College, coming as it does on the heels of a $1.2 million special appropriation from the State of Maryland for upgrading the school's science facilities and for enhancing its ability to contribute to analytical studies of the Bay.

MASSACHUSETTS

Presidential Awards for Excellence in Science and Mathematics Teaching

Robert F. Lawler
Mathematics
Shady Hill School
Cambridge, MA 02138

Susan F. Plati
Science
Wellesley Senior High School
Wellesley Hills, MA 02181

Fellowships

Boston University Boston, MA 02215 Minority Graduate Research Fellowships Support Grants	$ 20,100
Harvard University Cambridge, MA 02138 Graduate Research Fellowships Support Grants	$2,006,000
Massachusetts Institute of Technology (MIT) Cambridge, MA 02139 Graduate Research Fellowships Support Grants	$2,938,120
Tufts University Medford, MA 02155 Graduate Research Fellowships Support Grants	$ 32,700
University of Massachusetts - Amherst Amherst, MA 01003 Graduate Research Fellowships Support Grants	$ 98,100

George T. Ladd	TPE-8550609
Boston College	$49,555
Chestnut Hill, MA 02167	Chemistry
	12 months

"In-Service Institute for Teachers of Chemistry"

Boston College will offer an opportunity for 50 chemistry teachers from southern New England to upgrade and update their knowledge and teaching skills in order to improve chemistry education in the classrooms. This in-service Institute for Teachers of Chemistry will be conducted on one Wednesday and two Saturdays each month during the academic year and will include instruction in basic chemistry, microcomputers, testing and evaluation, and methods and materials of chemistry education.

This proposal is based on the successful implementation of a model program piloted during the 1983-84 academic year for physics teachers within a narrowly restricted geographic area.

Kenneth N. Prestwich	CSI-8650599
Department of Biology	$11,335
College of the Holy Cross	Biology
Worcester, MA 01610	30 months

"Microcomputer Data Acquisition, Manipulation, and Modeling in Physiology Laboratories"

An increasing number of scientific laboratories rely on microcomputers for data acquisition and manipulation, and as terminals to interact with other computers. Properly trained students should be familiar with the use of these computers, the means by which they are interfaced with laboratory instruments, and their advantages and limitations as compared to more traditional means of data acquisition. They also should be familiar with the techniques by which, for relatively simple phenomena, microcomputers may be used to construct simulations and models.

Through the purchase of microcomputers and the appropriate accessories, physiology students at the College of the Holy Cross will become thoroughly familiar with the techniques required to use a microcomputer to collect and analyze data directly from common laboratory instruments and also to use the computers as digital oscilloscopes. In addition, simulations and models will be included as adjuncts to most labs. Besides improving the students' abilities to visualize biological processes, these models will be used to develop testable predictions as to how biological processes should occur if they are largely the result of underlying mathematical, physical and chemical laws. Through this project students will have opportunity to develop a thorough appreciation for the power of the computer in modern laboratories. In addition to their major application in the Physiology labs, the computers will be used for modeling in General Ecology and Genetics laboratories.

Marlene Samuelson
Department of Science
Curry College
Milton, MA 02186

CSI-8650818
$33,156
Inter & Multidiscipl.
30 months

"Biochemistry and Environmental Science/Ecology as Areas of Concentration for Biology and Chemistry Majors"

Biochemistry and environmental science/ecology are being established as areas of concentration for biology and chemistry majors at Curry College. This is made possible by the recent acquisition of major equipment including a high performance liquid chromatograph, a refrigerated centrifuge, a UV-visible recording spectrophotometer, a fraction collector and gel electrophoresis apparatus. With this equipment, improved laboratory courses and opportunities to engage in significant research projects are now available to undergraduates in biology and chemistry, thus providing them with more relevant training and better opportunities for professional preparation in biochemistry and environmental science/ecology.

Glenn Kleiman
Mark Driscoll
John Richards
Education Development Center
Center for Learning Technology
55 Chapel Street
Newton, MA 02160

MDR-8651637
FY 86 $697,960
FY 88 $426,405
FY 89 $261,494
24 months

"Reckoning with Mathematics: Tools and Challenges for the Information Age"

Recent research on mathematics education and the psychology of learning indicates that mathematics instruction should recognize and support the role that students play in constructing their own understanding of mathematics. This requires a curriculum that enables students to experience mathematics as serving useful and interesting purposes, that treats problem solving as the central mathematics activity, and that builds mathematical concepts on concrete experiences.

This project will lay a foundation for a new elementary mathematics curriculum that responds to these needs. It will outline learning goals for a K-6 mathematics curriculum that will enable students to master the mathematical tools and procedures essential for literacy in an information age, define a complete scope and sequence, develop prototype curriculum modules, and produce supporting materials for teacher training and student assessment. The materials will emphasize problem solving and applications of mathematics, incorporate the best traditional materials, and fully integrate the calculator and computer, as tools, into the curriculum.

Harmon C. Dunathan
Dean of Faculty Office
Five Colleges, Inc.
Amherst, MA 01002

CSI-8652161
$23,500
12 months

"Conference on Cooperation"

Continuing the high quality of science education which historically has been provided by the small liberal arts colleges of this country will require serious consideration of the problems now being faced by the administrations, faculties and departments of these institutions. The National Science Board's recent report on Undergraduate Science and Engineering Education states that "Serious problems, especially problems of quality, have developed during the past decade in the infrastructure of college-level education in mathematics, engineering, and the sciences."

This conference focuses on fostering collaboration among institutions as one method of addressing these problems, capitalizing on the increased resources and diversity which could be provided through cooperative programs. The conference will address problems now affecting the undergraduate science curriculum. Too often these complex problems are given a simplistic diagnosis and routine prescription: more time, more equipment, better students. In contrast to that approach, this conference will raise questions about undergraduate science education aimed toward provoking discussions of new cooperative approaches and new answers. Conference participants will be drawn from 25-30 institutions representing a broad range of geography, institutional types, etc. An administrator and a faculty member will comprise a team from each. The conference will be held in November, 1986 with a schedule beginning on a Thursday evening with a banquet and keynote address, followed by 1 1/2 days of conference activities. The conference format will invoke three Sessions:
Session 1 (The Issues) - A plenary session in which questions concerning faculty, physical facilities and curricular strategies will be raised by a group of panelists with experience in the cooperative programs conducted by Five Colleges, Inc. This will be followed by small group sessions led by one or two of the panelists in which agreement on precise descriptions of the problem in each area will be sought.
Session 2 (Collaboration) - Demonstrations and discussions of Five Colleges, Inc. cooperative programs will be the focus - including cross-registration, faculty exchanges, and joint appointments. This will be followed by small group discussions led by Five Colleges, Inc. faculty.
Session 3 (Strategies and Solutions) - The workshop discussions of the previous session will continue in greater depth. The final activity will involve a plenary session devoted to further discussion of the problems defined earlier and how cooperation might address them.

In order to reach a wider audience, a conference report will be prepared for dissemination to colleges around the country.

Merle S. Bruno	TPE-8650170
Five Colleges, Inc.	$337,454
Amherst, MA 01002	30 months

"Partners in Elementary Science"

This project, Partners in Elementary Science (PIES), is designed to improve elementary science education by strengthening the confidence of elementary school teachers in teaching process/inquiry science in the classroom; helping elementary teachers link science activities to other academic areas, especially writing; and assisting principals in developing strategies to improve their elementary science programs. Fifty teachers, designated as National Science Foundation Fellows, will be selected from five representative school systems in western Massachusetts as participants for the first year of the project. The school systems represent different types of communities ranging from urbanized centers to rural communities.

The project will include Saturday workshops, a three-week summer institute focused on inquiry/process methodology in the life sciences and physical sciences, support during the academic year for the National Science Foundation Fellows including classroom assistance, and monthly workshops and seminars for principals regarding their role as instructional and organizational leaders. Math/science programs of the Western Massachusetts Five College Public School Partnership as well as community resource centers, such as the Hitchcock Center in Amherst, will provide continuous support for the project. Excellent support from the school districts will insure implementation of the project's objectives.

Howard W. Nicholson	CSI-8650414
Department of Physics	$44,558
Five Colleges, Incorporated	Physics
Amherst, MA 01002	30 months

"Establishment of a Five College Advanced Physics Laboratory"

This project will support the establishment of a cooperative advanced physics laboratory among the institutions of Five Colleges, Inc.: Amherst College, Hampshire College, Mount Holyoke College, Smith College, and the University of Massachusetts. The purpose of the course is to provide undergraduate physics majors at the five colleges with intensive, comprehensive experience with state-of-the-art instrumentation -- experience currently missing from the usual undergraduate curriculum. The equipment will be used to create a repertoire of advanced physics experiments built on the strengths of the individual departments. Each department will contribute and host experiments in a particular field, with all of the experiments made available to any advanced physics students at any of the five colleges. Amherst will be the site for atomic physics, Mount Holyoke for nuclear physics, Smith for cosmic ray physics, and the University for low temperature physics and microwave radiometry. This local cooperative enterprise is the logical solution to the problem of giving students a broad background in experimental techniques while simultaneously augmenting the special strengths of the departments individually.

Richard J. Murnane	SPA-8554462
Graduate School of Education	$249,952
Harvard University	Science and Mathematics
Cambridge, MA 02138	23 months

"Analyses of the Factors Influencing How Long Math and Science Teachers Stay in Teaching"

This research will analyze the factors that influence how long math and science teachers stay in teaching. These factors include personal demographic characteristics, subject area specializations, salaries, and school district characteristics. The investigators will use methodologies, known as waiting time models, that have not been used previously in studying teachers' career paths. They will apply these powerful methodologies to three longitudinal data sets, from rich data on individual teachers in Colorado, Michigan, and North Carolina.

The research will emphasize comparisons between math and science teachers and other teachers, between teachers trained to teach particular sciences, between time periods (early 1970's versus early 1980's), and between regions of the country.

The results should be valuable for two reasons. First, they will inform policy discussions about how to increase the attractiveness of the teaching profession to college graduates with math and science training. Second, they should provide information useful in improving the teacher demand and supply models used to predict teacher shortages and surpluses.

Linda Schulman	TPE-8652049
Lesley College	FY 86 $198,791
Cambridge, MA 02138	FY 87 $208,825
	FY 88 $232,681
	FY 89 $197,931
	FY 90 $161,329

"A Model Program for Preparing Preservice Middle School Science and Mathematics Teachers"

Lesley College, a women's undergraduate college, proposes to develop a program for preparing preservice middle school science and mathematics teachers that is founded on the belief that the best middle school teacher combines expertise in her subject area with strong pedagogical and diagnostic skills. Following the recommendation of the National Middle School Association, the program will provide content concentration in two areas, science and mathematics. The project will design a sequence of 40 credits in mathematics and science, including nine with a unique interdisciplinary focus. In all, five science courses, five mathematics courses, three interdisciplinary content courses, and five professional courses will be developed or modified. The interdisciplinary component will make explicit the implied interrelations between mathematics, science, society, and the teaching profession. The emphasis will be on methods of inquiry, criteria for truth in different disciplines, and an understanding of the nature and limits of knowledge. The interdisciplinary component will culminate with a student research project in the natural sciences that calls for the use of scientific and behavioral science methods. The 29-hour professional education component will culminate in an integrating seminar which will challenge students to create new visions and alternatives for curriculum development and education. The program will be developed by teams of scientists and educators.

The project will take advantage of collaborative relations with the public schools and a science laboratory resource center at the college. The project will also develop strategies for recruiting talented women into the middle school teaching profession. The entire project will be carefully evaluated through the Program Evaluation and Research Group at Lesley College; information about the program and its efforts will be widely disseminated.

Kenneth L. Williamson CSI-8650901
Department of Chemistry $16,769
Mount Holyoke College Inter &
Multidiscipl.
South Hadley, MA 01075 30 months

"Scientific Video Equipment"

The quality of undergraduate laboratory instruction at Mount Holyoke College is being enhanced through the recent acquisition of video equipment to illustrate the conduct of laboratory work on a micro scale in chemistry, biology and psychology. Micro-scale laboratory work is necessary in many departments currently for reasons of safety, economy, and ease of waste disposal. In each of the three disciplinary areas, high resolution, high color fidelity video is being used to instruct students in micro-manipulation and identification. Properly recorded and edited video tapes preserve simulations and experiments for student use in the future.

Lilian M. Hsu	CSI-8650956
Program in Biochemsitry	$38,661
Mount Holyoke College	Biology
South Hadley, MA 01075	30 months

"Modernization of an Undergraduate Biochemistry Laboratory"

The field of biochemistry has advanced significantly in the last decade. Much of the progress is directly attributable to the development of techniques with greatly enhanced power of resolution and speed of analysis. Integration of computer-assisted data collection and data analysis capability in modern equipment has further revolutionized the conduct of biochemical experimentation. The Mount Holyoke faculty provides a rigorous biochemistry curriculum with heavy emphasis on laboratory experience -- one that is regularly reviewed and updated. Thus in the upper-level biochemistry courses, the lecture coverage in general has kept pace with the rapidly advancing field. In contrast, the laboratory exercises, although sound and current in design, had been poorly implemented due to old instrumentation. This award provides funds for major equipment acquisitions needed to drastically upgrade the laboratory facility. The improved facility makes possible the rigorous probing of experimental questions by modern means of analysis. Furthermore, the use of computer-enhanced analytical capability is being emphasized. The College enjoys an enviable record for producing women scientists -- a record that should be further enhanced through this project.

Martin Simon	TPE-8552391
Mount Holyoke college	FY 86 $292,677
South Hadley, MA 01075	FY 87 $160,000
	21 months

"Educational Leaders in Mathematics (ELM) Project"

This Leadership Activities project will provide enhancement and professional development experiences for 120 exemplary mathematics teachers from the western Massachusetts and northwestern Connecticut area. Both elementary and secondary mathematics teachers will be involved. The overall goals of the multiyear project involve the updating and deepening of the participants' mathematical backgrounds and teaching methodologies with emphasis upon problematic and constructivist perspectives, the networking of the staff and participants through regular school visitations and group workshops, the conduct of frequent in-service helping and sharing sessions by the participants in their schools, the dissemination of the project materials and results, and the investigation of the modelistic approach within a carefully planned documentation, assessment and evaluation effort.

The teacher enhancement model is organized into five stages of leadership development. In the first stage (a two-week summer workshop) teachers intensely study mathematical problem solving and constructive teacher practices. In stage two (academic year follow-up) teachers apply and practice new techniques and receive coaching guidance in weekly classroom visits by the ELM Project staff. Stage three involves a second two-week summer advanced workshop which deepens and reinforces their experiences and begins their training for conducting in-service work with their peers. In stage four (second academic year follow-up) the advanced leadership teachers and ELM Project staff plan and conduct in-service workshops for school colleagues. At stage five the leadership teachers conduct workshops with minimal guidance from project staff.

Inabeth Miller Museum of Science Boston, MA 02101	TPE-8652010 $244,520 18 months

"A Massachusetts Museum Network for Elementary Science Kits and Training"

The project will disseminate an elementary science outreach and kits program through a network of eight museums in Boston, Massachusetts. The Museum of Science successfully piloted this approach in four communities in 1984-1985. The approach involves developing elementary science kits and conducting teacher training workshops in the use of kit materials. Kits emphasize the use of manipulative materials, and choices of kit topics are based on reviews of curricula and texts in elementary science, museum strengths in terms of collections, and major topics that will be represented at the museums. Each kit is a complete set of instructional materials, including all supplies required. Kits are rented to schools for five weeks for a reasonable fee. Consumables are resupplied each time the kit is returned.

In the effort to expand the program statewide, the Museum of Science, Boston, will provide development and production of new kits; distribution of kits to regional science centers; curriculum development to accompany kits; central coordination and accounting; development of workshops accompanying kits; training of staff from other museums. The network of museums will provide creative input into the development of new kits; workshops for teachers in how to use the kits; kit distributions to local users; site visitations to assist teachers; marketing efforts to local communities.

Frank Gardner Boston Museum of Science Boston, MA 02101	TPE-8554405 FY 86 $332,770 FY 87 $150,000 24 months

"Collaborative Institute for Improving Science Literacy Among Elementary School Teachers"

Seven museums in the Boston area, Arnold Arboretum of Harvard University, Boston Children's Museum, Boston Museum of Science, Boston Zoological Society, Museum of Comparative Zoology at Harvard, and New England Aquarium have collaborated to form The Museum Institute for Teaching Science (M.I.T.S.). This collaborative has proposed a three-week summer institute for 84 teachers and a follow-through program during the school year to create a professional partnership between classroom teachers and the diverse resources of the museums.

Summer activities will focus on field work, the nature of scientific inquiry, and hands-on activities which are immediately applicable to the classroom. Teachers will participate in field trips which will be replicable in their own locales, develop topical curricula based on the particular resources available in the various facilities, and be trained in the inquiry process of science, be given the opportunity to strengthen their content background. Teachers will have a chance to choose three of seven topics to pursue each summer. The topics vary according to the site offering the workshop.

Follow-up activities include school visits, an M.I.T.S. Newsletter, and a teacher support and resource telephone system.

Leslie Kaufman/Richard Lyons
New England Aquarium Corp.
Central Wharf
Boston, MA 02210

MDR-8650095
FY 86 $ 61,050
FY 87 $212,921

"The Thinking Gallery: Development of an Inquiry-Driven Gallery in a Living Museum"

The New England Aquarium will develop an "inquiry-driven" gallery for the study of aquatic sciences in a move to go beyond the "naming" experiences in biology and environmental education.
The project will focus on seven conceptual themes: 1) adaptation and evolution; 2) habitat; 3) life cycles; 4) development and metamorphosis; 5) species interactions; 6) energy flow: and 7) signals and senses. The exhibits will challenge the visitor with questions, puzzles and games. Curriculum materials will be developed for teachers along with a users guide for visitors. Outreach activities are planned, aimed at minority students and visitors. The Aquarium serves approximately 155,000 students and over one million visitors every year.

The redesigned gallery will house eight tanks, ranging from a series of small tanks with accompanying video clips that display seldom seen behaviors such as the "birth" of seahorses, lobster molting, etc. to three 250-gallon tanks that will display ancient fishes and a variety of species showing different kinds of locomotion, color and sound. A 2500-gallon tank housing a school of fish will demonstrate different ways terrestrial and aquatic animals sense their surroundings. A 4000-gallon floor to ceiling tank will display a salt marsh on one side and a mangrove forest on the other and a 6000-gallon tank will house large groupers, moray eels and small gobies. The NSF award represents $273,971 out of a project total of $857,986.

Valerie Crane
Research Communications Ltd.
824 Boylston Street
Chestnut Hill, MA 02167

MDR-8550896
FY 86 $125,590
12 months

"An Exploratory Study of 3-2-1 Contact"

This research project will explore a number of factors concerning the children's television series "3-2-1 Contact" including: (1) awareness of the series on the part of children, parents, and teachers;
(2) perceptions of appeal and comprehensibility of the program format among both viewers and non-viewers; (3) the demographics and viewing habits of viewers and teacher users; (4) reasons for particular modes of viewing and use; and (5) impacts that result from viewing. A major goal of this exploratory study is to identify factors that require more detailed, controlled research before their influence can be fully understood and that offer promise of productive research because their influence is clearly significant.

The study will focus on 100 children in the 8-12 year age range (the target audience), 100 viewers in the 4-7 year age, 100 parents of viewers, and 150 teachers of grades 3-6. Two-hour group sessions will provide study subjects with opportunities to respond to questions on series awareness, modes of viewing and using the series, and series impact. Subjects will complete written questionnaires, view selected program segments from the series, and then participate in oral interviews.

The expected outcomes of the study are: (1) a description of the viewing audience; (2) an understanding of patterns of series viewing at home and use in the schools; (3) the role of parents and teachers in stimulating children to view the series; (4) a picture of audience response to program formats and performers; and (5) a measure of program comprehensibility among different types of viewers. The final outcome will be a comprehensive research model for additional study of "3-2-1 Contact" as a vehicle for science education.

Richard P. Nickerson	TPE-8643365
Simmons College	$202,080
Boston, MA 02115	Life Sciences
	12 months

"Resource Partnerships in the Life Sciences"

This project will select 25 high school biology teachers and 25 middle school science teachers and will involve them in an intensive residential summer workshop focusing on the importance of fostering reasoning and observation skills in the learning of the life sciences. Working in pairs (biology teacher/science teacher), participants must develop a Science Leadership Plan including workshops they will conduct, informal partnerships they will form, and services they will provide as resource persons after they return to their home school district.

The summer workshop experience will include presentations by prominent scientists, visits to museums, evaluation of educational software, and other participants. Participants will also return to Simmons College twice during the academic year to share the results of their efforts to implement their new learnings into their classrooms.

Richard F. Olivo	CSI-8650564
Department of Biological Sciences	$33,191
Smith College	Biology
Northampton, MA 01063	30 months

"Computer-Interfaced Equipment for Improving Undergraduate Physiology and Neurobiology Laboratories"

This project enables the Biology faculty at Smith College to enhance its laboratory teaching of Physiology and Neurobiology by acquiring new, state-of-the-art instrumentation. The new equipment includes digital storage oscilloscopes which can freeze transient data for examination by students and discussion with their professors; dual channel chart recorders, controllable by computers, to make hard copies of data for analysis; microcomputer-based data acquisition systems (updating an innovative data system originally designed at Smith) to give students in Neurobiology access to improved techniques for studying the nervous system; and stimulators and amplifiers, for use in physiological and neurobiological experiments. With this improved, modern instrumentation, Smith College is continuing its tradition of preparing women for careers in science. The project's Principal Investigator is being encouraged to publish the novel elements of his undertaking so that other institutions may benefit from them.

Susan N. Friel	MDR-8651649
Susan Jo Russell	FY 86 $572,009
Technical Eduction Research Ctrs.	FY 88 $372,863
1696 Massachusetts Avenue	24 months
Cambridge, MA 02138	

"Used Numbers: Collecting and Analyzing Real Data

Data analysis can provide a powerful and relevant approach to teaching key mathematical skills to elementary school children. It provides a meaningful context for the use of computation skills. It involves students directly with important mathematical ideas that are applicable to science, social science, and problem solving. It is a vehicle for bringing real applications of mathematics into the classroom. It is a topic that is familiar to teachers.

And calculators and computers provide tools for collecting and analyzing data in the classroom that previously have not been available.

This project will develop recommendations, prototype materials, and calculator and computer activities to be infused into a new K-6 curriculum strand on data analysis. The materials will emphasize age-appropriate data analysis skills such as counting, comparing, classifying, looking for patterns, finding central tendencies and variation, and predicting trends.

This project will target a broad range of students, especially those who have historically been underserved (girls, minorities, and disadvantaged students). Project materials will reach approximately 10,000 teachers through a network that will distribute a newsletter as well as the student materials. Videotapes will be produced for use in teacher education.

Robert F. Tinker	MDR-8550373
Nancy Roberts	FY 86 $349,976
Technology Center	FY 87 $149,982
Technical Education Research Center	
1696 Massachusetts Avenue	
Cambridge, MA 02138	

"Modeling: Instructional Materials and Software for Theory Building"

The goal of this project is to give students in grades 7-12 tools and materials to understand complex systems. Students will be able to create models of complex situations and evaluate the correctness of their models using empirical data. In short, they will be able to build and test theories, and apply these skills to the sciences.

This goal will be accomplished by a three phase project to develop powerful, fast software packages with good user interfaces that allow easy model creation and testing, together with a sequence of instructional material using this software. This project funds the first phase of this effort during which prototype software and material will be developed, tested and published. The resulting curriculum materials will be widely disseminated through newsletters, symposia, teacher workshops, professional presentations and commercial publication.

The material will be developed by Technical Education Research Center (TERC) with the collaboration of leading educators and area schools.

This project is funded jointly with the Instructional Materials Development Program.

John S. Cameron	CSI-8650486
Department of Biological Sciences	$17,294
Wellesley College	Biology
Wellesley, MA 02181	30 months

"Computerized Data Acquisition and Analysis for the Undergraduate Physiology Laboratory"

The objective of this project is to make a significant contribution to improving Wellesley's undergraduate Physiology laboratory through the acquisition of electronic recording and monitoring equipment that will allow the incorporation of computer-based data collection and analysis techniques. The instruments to be acquired, when interfaced with general purpose microcomputers currently available in the department, will provide invaluable experience with modern physiological research techniques, as exemplified by thirteen already-developed student exercises and by others yet to be prepared.

Successful laboratory exercises will be collected into a manual for dissemination to other institutions. In addition, the equipment will allow the Wellesley faculty to increase opportunities for independent research by undergraduate students in the department, and to enhance the honors research program. This project ultimately is aimed at increasing the number and improving the educational experience of women who choose careers as professionals in the biomedical and allied life sciences. The project's impact at Wellesley will be felt at once; a broader national impact also may be gained.

Kevin M. Jones	CSI-650733
Department of Physics & Astronomy	$14,239
Williams College	Physics
Williamstown, MA 01267	30 months

"Computer Controlled Laser Spectroscopy for Undergraduate Instruction"

The Williams College Department of Physics and Astronomy will purchase equipment to conduct laser spectroscopy experiments. Junior and senior undergraduates will use the equipment in laboratory courses to explore laser spectroscopy and computer control of experiments. A nitrogen pumped dye laser, a spectrometer, and a boxcar integrator will be used to explore some of the recently developed techniques of modern spectroscopy. All three instruments will be controlled by a computer. The boxcar integrator, which is a tool for recording fast electronic signals, and the computer will also be used by senior honors students carrying out original research under the supervision of a faculty member. This sophisticated modern equipment will be an important addition to the college's teaching facilities.

Steven J. Zottoli	CSI-8650488
Department of Psychobiology	$49,250
Williams College	Inter & Multidiscipl.
Williamstown, MA 01267	30 months

"Instrumentation for the Neurosciences"

Course offerings in the neurosciences at Williams College form the basis of an interdisciplinary Psychobiology Program with content ranging from single cell analysis to the neural basis of learning and memory. From this, a student-initiated interdisciplinary major in the neurosciences has developed. As a part of this unique major, students are required to participate in research and to prepare an Honors thesis.

The instrumentation acquired for this project (preamplifiers, digital oscilloscopes and computerscopes) allows students to participate in comprehensive laboratory experiences in the Psychobiology Program and in the neuroscience major. Laboratories in intracellular recording, voltage clamping and evoked potential recording in lower vertebrates and humans expose students to the diverse nature of physiological recording techniques and data analysis, providing a firm background for these students' professional careers.

MICHIGAN

Presidential Awards for Excellence
in
Science and Mathematics Teaching

Johanna L. Brown
Mathematics
Swartz Creek Middle School
Swartz Creek, MI 48473

Dennis B. Travis
Science
Bloomfield Hills Lahser High School
Bloomfield Hills, MI 48013

Fellowships

Individual Awards for Foreign Tenure Graduate Research Fellowships	$51,300
Michigan State University East Lansing, MI 48824 Graduate Research Fellowships Support Grants	$46,770
University of Michigan - Ann Arbor Ann Arbor, MI 48109 Graduate Research Fellowships Support Grants	$567,710
Wayne State University Detroit, MI 48202 Graduate Research Fellowships Support Grants	$10,150

Janet Shroyer	TPE-8651489
Aquinas College	$178,438
Grand Rapids, MI 49506	26 months

"A Leadership Training Program for Middle Grade Mathematics Teachers"

This Leadership Activities project will provide opportunities for 30 teachers in the state of Michigan to become knowledgeable about the Middle Grades Math Project (MGMP) and its attendant instructional model and to subsequently serve as leaders in mathematics education in their school districts. Sixty peers of the 30 leader teachers will also have the opportunity to learn more about the materials and model in a summer workshop in 1987. Both the leader teachers and the peer group will have follow-up support from the Aquinas College staff and from administrators and supervisors in their own school districts. All participants, especially the leader teachers, will be encouraged to develop additional instructional materials consistent with those developed by the MGMP.

The leader teachers will be recruited for the program by Aquinas College staff in cooperation with district administrators who recognize their instructional skills, desire for improvement, and leadership potential. The leader teachers will be actively involved in the identification of the peer teachers in the second year. The leader teachers will also be responsible for conducting inservice programs in their school districts in addition to implementing the MGMP units and instructional methodology in their own classrooms.

The project will have direct support from the developers of the MGMP materials and will allow immediate use and evaluation of those materials in a summer school of middle grade students. A well-developed evaluation model will allow measurement of the impact of the program on both the teachers and their students.

David A. Van Baak	CSI-8650555
Department of Physics	$5,338
Calvin College	Physics
Grand Rapids, MI 49506	30 months

"A Low-Energy X-Ray and Gamma Detector for the Advanced Physics Laboratory"

Calvin College will strengthen the undergraduate physics program by the purchase of a low-energy X- and gamma-ray solid-state spectrometer. It will enrich the experience of juniors and seniors in their laboratory and research courses, by making it possible for them to perform classic experiments in atomic and nuclear physics, and also to perform individual research projects involving ionizing radiation.

Clifford M. Renk	CSI-8650413
Associated Health Professions	$33,038
Eastern Michigan University	Biology
Ypsilanti, MI 48197	30 months

"State-of-the-Art Instrumentation for Improving an Undergraduate Immunology Laboratory"

This project provides funds for Eastern Michigan University to strengthen and expand the Immunology laboratory curriculum and to give students experience in utilizing state-of-the-art instrumentation. The field of immunology is one of the fastest growing scientific areas; immunological techniques are used by an ever increasing number of scientists in a multitude of disciplines. Because of the wide application of immunological methods in biotechnology, a basic laboratory course in immunology is fundamental for students in biology, chemistry, microbiology, immunology and related disciplines.

The equipment needed to implement the curricular revisions include an inverted phase contrast fluorescent microscope, enzyme immunoassay reader-spectrophotometer, scintillation counter, laminar flow hood, CO_2 incubator, refrigerated centrifuge, and immunoblot membrane filtration assay system. This equipment will allow EMU's Biology faculty to focus on current techniques in both the cellular and humoral aspects of the immune system. Curricular changes will result in an ability to teach both basic and advanced techniques in one of the most demanding, useful and interesting areas of science. The techniques learned will provide a firm foundation for students seeking advanced courses in basic sciences, and these methodologies will prove useful for future scientists in academic or industrial research settings. This project holds considerable promise for helping EMU's Biology Department to make an important advance in modernizing its curriculum.

John W. Moore
Joseph J. Lagowski
Eastern Michigan State University
Department of Chemistry
146 Pierce
Ypsilanti, Michigan 48197

MDR-8642838
FY 86 $120,365
14 months

"SERAPHIM High School Outreach Project"

The purposes of this project are the evaluation, development and dissemination of software for chemistry instruction. In addition, the staff have conducted workshops to educate teachers in the use of computer technology.

This grant is a supplement to award #MDR-8400351. The project has expanded greatly beyond initial expectations and now has nine Regional Distribution Centers in the United States and eleven world-wide. Japan has recently invited the Project Director to meet with its representatives to look at possibilities for setting up a Center in that country.

There are crucial areas where additional resources will allow the project to continue meeting the great demands made on it. The Clearinghouse, which now distributes over 1,000 diskettes monthly, will receive help to enable it to continue its functions. Additional funds will provide for more staff time for preparation and distribution of materials.

The Project has conducted 55 Workshops to date and has developed a great deal of momentum and enthusiasm. To maintain this interest, SERAPHIM will offer workshops at the Biennial Conference on Chemical Education in July of 1986, an activity made possible through a supplemental award.

The SERAPHIM Advisory Committee recommended the production of five new Programs, each involving a new approach and with potential to change the way computers are used in teaching high school chemistry. Demands on current staffing have prohibited these new developments. This supplement will permit work to be done on two of the five new software concepts.

Thomas L. Johnson
Department of Physical Sciences/Astronomy
Ferris State College
Big Rapids, MI 49307

CSI-8650762
$5,638
Physics
30 months

"Solar Telescope and Laboratory"

Ferris State College will construct a solar telescope to use in introductory astronomy courses. The components will be a heliostat, a dual projection system, and an imaging system including a hydrogen-alpha filter and low-light television camera. The telescope will be permanently mounted and used for a variety of kinds of solar observations. These include observing sunspots and other solar features, the solar spectra, solar rotation, and projection viewing of the moon and bright planets. In this way students may make detailed observations of and measurements on the nearest star. The solar telescope will enhance substantially the experience of astronomy students.

Ronald W. Ward	CSI-8650697
Department of Biology/Geology	$12,582
Grand Valley State Colleges	Inter & Multidiscipl.
Allendale, MI 49401	30 months

"New Equipment for the Aquatic Sciences Program"

This project provides equipment for use aboard the D.J.ANGUS (a teaching vessel constructed with College and private funds) to continue and improve Grand Valley State Colleges' interdisciplinary programs in aquatic science. Unique instructional opportunities are provided for undergraduate college students, K-12 teachers and selected high school students to conduct biological, chemical, geological, meteorological and other physical studies of lacustrine and riverine ecosystems in the field. Departments involved include Biology, Geology, Physics and Engineering, and Natural Resources Management.

Christopher C. Barney	CSI-8650677
Department of Biology	$8,870
Hope College	Biology
Holland, MI 49423	30 months

"Purchase of a Computerized Data Acquisition System for an Undergraduate Physiology Laboratory"

The goal of this project is to improve the scientific education of Hope College's Biology students by providing the modern scientific instrumentation needed to assure the currency and quality of their laboratory experiences. In physiology and other biological sciences, computerized data acquisition and analysis systems are being used more and more frequently in research and teaching. Purchase of a computerized data aquisition system allows students in Introductory Biology courses, Human and Vertebrate Physiology courses and the Independent Research course to have hands-on experience with this modern instrumentation and to gain an appreciation of the power, speed and overall usefulness of computerized data acquisition and analysis systems. The instrumentation makes possible new experiments in the teaching laboratories and improves the quantity and quality of the data gathered both in regular courses and in independent research.

Edward C. Hansen	CSI-8650832
Department of Geology	$19,543
Hope College	Earth Sciences
Holland, MI 49423	30 months

"Update and Expansion of X-Ray Instrumentation Used in the Geology, Chemistry, and Physics Curricula"

X-ray diffraction techniques, both powder and single crystal, are important components of modern geology, chemistry and physics curricula. X-ray fluorescence and powder diffraction as analytical tools are absolutely essential to the field of geology. The advent of solid state materials such as semiconductors and thinly coated substrates makes X-ray analysis an even more integral part of chemistry and physics than it was in the past.

The existing teaching and research X-ray facility at Hope College has recently been remodeled and refitted to update the powder facility and to expand the capabilities to include single crystal photographic techniques. The modernized unit, which is a state-of-the-art teaching and research facility, is being utilized by students in five geology courses, two chemistry courses and one course in physics. The facility is also being used for undergraduate research activities.

Charles E. Deutch	CSI-8650208
Department of Biology	$5,326
Kalamazoo College	Biology
Kalamazoo, MI 49007	30 months

"Gel Electrophoresis Apparatus to Upgrade an Undergraduate Molecular Biology Laboratory"

The Biology faculty at Kalamazoo College is improving the laboratory portion of its Molecular Biology course through the introduction of experiments that employ gel electrophoresis. The biology curriculum includes core courses in Populations and Ecosystems, General Zoology, General Botany, and Cellular Biology, as well as a number of advanced electives. One such elective is an upper-level course in Molecular Biology, which consists of a lecture series based on B. Lewin's textbook Genes II, a journal club based on readings from the primary literature, and a laboratory. The purpose of this project is to improve the laboratory component of this course. A new series of experiments will be introduced based on the lab text Recombinant DNA Techniques: an Introduction by Rodriquez and Tait. These experiments will involve gene cloning in Escherichia coli, and utilize gel electrophoresis at several points. The equipment obtained as part of this project is being used to monitor cleavage and ligation of DNA molecules, as well as to construct a restriction endonuclease map of a cloned DNA fragment. Students completing these experiments are expected to develop a better understanding of the concepts and methods in molecular biology, and to be prepared to do further work in this area.

Ronald Foster
Department of Electrical Engineering
Lawrence Institute of Technology
Southfield, MI 48075

CSI-8650384
$25,050
Engineering
30 months

"Digital Control and Robotics Laboratory"

The aim of this project is to improve the quality of instruction in digital control systems, robot interfacing and control, and robot vision in the Electrical Engineering Department of Lawrence Institute of Technology. The project will use eight workstations, the major equipment for which will be: 1) a computer to act as the system host for all equipment during student experiments, 2) a robot arm and controller, 3) a high speed analog/digital-digital/analog converter used for digital control and robot interfacing experiments, and 4) a video imaging system to direct the robot arm and gripper for part orientation.

This laboratory is especially significant because it will prepare students for electrical engineering applications of robotics and digital control systems. Automation using robotics is an important aspect of future industrial development, and it is important to teach the subject in an engineering college.

Clarence H. Suelter
Michigan State University
East Lansing, MI 48824

TPE-8651680
FY 86 $277,713
FY 89 $147,287
Biology
36 months

"Workshop in Molecular Biology for Honors High School Teachers"

This project funds a workshop to explore frontiers in molecular biology, to do laboratory activities that have high potential for inclusion in regular high school biology courses, and to discuss applications in biotechnology and their related science-based societal issues.

Thirty-two secondary teachers of biology or chemistry will attend a five-week summer workshop beginning in July of 1987. During this segment of the program, participants will attend lectures, do laboratory work, participate in seminars given by faculty from 12 different disciplines, hear guest lectures by representatives from pharmaceutical and food industries, and observe demonstrations by several scientific companies of equipment suitable for use in high school biology curricula.

Time is set aside each week for teachers to meet as a group to share experiences and to seek ways to improve course offerings. Each teacher will be expected to do laboratory experiments that can be used in the classroom. Teachers will be encouraged to publish suitable experiments.

Elizabeth Phillips
Michigan State University
East Lansing, MI 48824

TPE-8550424
$198,101
Mathematics
24 months

"Honors Workshop on the Teaching and Learning of Algebra"

This Leadership Activities project will provide enhancement and professional development experiences for 24 exemplary mathematics teachers and 48 of their less well-prepared school colleagues. The overall goals of the project involve the updating and deepening of the participants' mathematical backgrounds and teaching methodologies, the networking of the participants, the conduct of frequent school- and campus-based helping and sharing sessions by the participants and project staff, and the investigation of the modelistic approach within a carefully planned documentation, assesssment and evaluation effort. Participants will be carefully selected to assure commitments of the leader teacher, their two peers, and their school administrators to the project goals.

The project will operate from a conceptual model of teacher education which encompasses five phases for constructing new knowledge for leadership activities: demonstration, practice, feedback, coaching for transfer, and coaching for leadership. In the first summer 24 high school algebra teachers will participate in a three-week workshop on the campus of Michigan State University. They will study the conceptual development of elementary algebra as well as new applications in coding theory and linear programming, observe teaching demonstrations with beginning algebra students, and develop plans and activities for implementation into their own teaching. During the next school year the teachers will integrate new teaching practices and algebraic applications into their classes, which project staff will visit at least three times for coaching sessions. The entire group will meet three times (5 days) back on the campus to share and assess progress and to plan for the outreach during the second year. During a one-week summer conference, the 24 honors teachers wil work with two peers to begin their team improvement. During the 1987-88 school year the lead teachers will continue to coach these outreach teachers, who will be visited and also coached by the principal investigators.

Glenn D. Berkheimer	MDR-8550336
Harry A. Eick	FY 86 $161,239
Charles W. Anderson	FY 87 $161,131

Michigan State University
Department of Teacher Education
East Lansing, Michigan 48824-1034

"Educational Systems to Increase Student Achievement"

The purpose of this project is to design an approach to science instruction that takes into account some findings from cognitive research. It has been widely demonstrated that students come into the classroom with invalid perceptions about physical phenomena which are not altered by current forms of instruction. Through interviews, this project will document the general misconceptions held by students, identify these for teachers, and develop methods which directly confront the misconceptions. The student materials will consist of a unit, "Models of Matter", which will be modified to also confront the commonly held misconceptions. The final product will be an educational system that integrates learning activities and teaching strategies to cause conceptual change.
The modified "Models of Matter" unit will be randomly assigned to 12 of 24 Lansing, Michigan Public School grade six classes to test its effectiveness in increasing student achievement and promoting recommended teaching strategies. The remaining 12 sixth grade classes will use the unmodified "Models of Matter" unit.

The project expects to demonstrate how authors can use existing research findings to modify commercial textbook units and teacher guides to increase student learning. Since most teachers structure their teaching around a commercial textbook, the project has national significance for improving student achievement in science.

William W. Ralph	CSI-8650816
Department of Physics	$24,494
Northern Michigan University	Inter & Multidiscipl.
Marquette, MI 49855	30 months

"Interdisciplinary Instrumentation and Analysis Laboratory"

The recent establishment of an Instrumentation and Analysis Laboratory at Northern Michigan University is providing science and applied mathematics students with instruction and laboratory experience in instrumental techniques and procedures, including data acquisition and analysis through interfacing with six microcomputer stations. These improvements are being implemented through a newly designed interdisciplinary course in Instrumentation and Analysis, and through expanded experimental work in advanced laboratory projects.

David S. Dalgarn	CSI-8651009
Department of Biology	$25,375
Saginaw Valley State College	Biology
University Center, MI 48710	30 months

"A New Ultracentrifuge to Upgrade Undergraduate Studies in Cellular and Molecular Biology"

To assist the Department of Biology to more fully develop laboratories in Cellular and Molecular Biology, NSF is providing funds for the addition of an ultracentrifuge with three rotors. A major trend in biology today is the understanding of biological phenomena in these two areas. This equipment enables students in the Cell Biology course to perform sophisticated experiments dealing with the isolation of cellular organelles and DNA.

The addition of an ultracentrifuge to the equipment already available in the laboratories through the combined efforts of the State of Michigan and two major industrial firms in the community allows students in the Molecular Biology course to do all of the critical techniques involved in the area of genetic engineering.

Harold W. Stevenson	BNS-8605588
Shin-ying Lee	FY 86 $69,098
University of Michigan-Ann Arbor	$50,000 (RTL)
Center for Human Growth & Development	$19,098 (SDP)
300 W. Ingalls Building, 10th Floor	12 months
Ann Arbor, MI 48109	

"Mathematics Achievement: Japanese, Chinese and American Children"

American students lag behind students of many countries in their achievement in mathematics. Chinese and Japanese students, on the other hand, have obtained scores yielding some of the highest national averages in a number of cross-national comparisons involving many countries. This has been found to be true for first-graders and fifth-graders in previous research by these investigators and for junior - and senior - high students in studies by other investigators.

Stevenson and his collegues are now exploring the question of why young American children perform so poorly. In their recent research, they have assessed mathematics achievement of first- and fifth graders in Sendai, Japan; Taipei, Taiwan; Chicago, Illinois; and Beijing, China through a group test of calculation and 12 individually administered schools in each city were tested, except for Chicago, where a representative sample of 20 schools was selected. Individual tests were administered to 3 boys and 3 girls, randomly selected from each classroom. Four hours of observation of mathematics classes in each classroom were conducted. Two observers were present each hour, one writing a running description of the content of the lesson, and the other following a coding scheme developed for a time-sampling procedure. Mothers of the subsample of children from each classroom were interviewed concerning daily activities at home, and the teachers in each classroom were interviewed concerning their beliefs and practices concerning mathemamtics instruction. A questionnaire was given to the fathers of the children in the subsample, and a brief interview was conducted with the principal of each school.

This grant provides funds for data analysis. Analyses of the data will be directed at the cross-national comparison of mathematics abilities and at the detection of significant correlates of mathematics achievement.

Charlotte A. Otto	CSI-8650668
Department of Chemistry	$16,000
University of Michigan-Dearborn	Chemistry
Dearborn, MI 48128	30 months

"High Performance Liquid Chromatography (HPLC) for Undergraduate Laboratories"

This project will provide undergraduate students at the University of Michigan-Dearborn with experimental capabilities afforded by modern HPLC instrumentation. The equipment will be used in courses throughout the curriculum, including organic, advanced organic, advanced inorganic, analytical, and environmental chemistry laboratories, biochemistry, molecular biology, and a special course in chromatographic separations. Undergraduates will perform experiments which illustrate the multidisciplinary uses of HPLC and the variety of analytical applications of this powerful, widely used experimental technique, from compound identification and percent product distribution to design and optimization of separation systems. The students will gain experience with both refractive index and ultraviolet/visible absorbance detectors, and with microprocessor control of HPLC instrumentation.

Stanley Kirschner	TPE-8650140
Wayne State University	$123,262
Detroit, MI 48202	Chemistry
	15 months

"The Enhancement of Chemistry and Teaching Skills of Middle School Teachers"

This project will provide enhancement and professional development for approximately 40 middle school teachers from public and private school systems in the metropolitan Detroit area (Wayne, Oakland, and Macomb Counties), for a five-week summer workshop, a semester of follow-up sessions, and visitations to classrooms. Further, it proposes to make available the materials developed during the workshop to middle school teachers across the Nation through articles outlining the model and methods used in the project.

One of the major objectives of this proposal will be to conduct a workshop that will improve the knowledge of chemistry of middle school teachers and also students. Modern science topics appropriate for middle school students; how chemistry concepts and principals can be applied to students' personal lives and career choices; and societal issues and technology will be the foci of the workshop. Emphasis will be placed on the development of inquiry process and problem-solving skills.

MINNESOTA

Presidential Awards for Excellence in Science and Mathematics Teaching

Lois Fruen
Science
Breck School
Minneapolis, MN 55422

Marlys J. Otis
Mathematics
Central Junior high School
White Bear Lake, MN 55110

Fellowships

University of Minnesota Minneapolis, MN 55455 Graduate Research Fellowships Support Grants	$232,220

Mark Engebretson	ATM-8606388
Department of Physics	$35,400
Augsburg College	Physics
Minneapolis, MN 55454	30 months

"Analysis of ULF Pulsation Data from Ground and Satellite Magnetometers Using a Multiuser Microcomputer System"

This project provides computer equipment for the analysis of geomagnetic pulsations observed in magnetometer data from various satellite and ground-based observatories. The instrumentation will alleviate a significant limitation of current efforts by providing a small, multiuser computer system compatible with those currently in wide use in this field. The principal investigator has collaborated with The Johns Hopkins University Applied Physics Laboratory in analysis of satellite magnetometer data. He is developing ultra-low frequency (ULF) wave display and analysis software for the magnetometer data from several operating satellites as well as future missions.

Past and current work at Augsburg College, in collaboration with scientists at several institutions, has resulted in a variety of contributions to the understanding of ULF pulsations in the earth's magnetosphere, and contributes to the education and research experience of undergraduates who later pursue graduate study and/or careers in science and engineering. The major application of this effort (waveform analysis) is particularly well suited to undergraduate student research. Applications include reduction and analysis of data obtained from the South Pole, and participation in the Space Physics Analysis Network. This project continues a strong undergraduate research program, increases its productivity, and enables additional qualified students to participate.

Frank Wolf	CSI-8650972
Department of Mathematics	$28,261
Carleton College	Social Science
Northfield, MN 55057	30 months

"Statistics Laboratory for the Social Sciences"

A statistics laboratory has been established at Carleton to support undergraduate courses in the departments of Economics, Political Science, Sociology/Anthropology, Psychology and Mathematics. Students will have substantial hands-on experience with real data about real problems of interest to them, and will gain understanding of both the power and limitations of statistics. The statistics laboratory is based on:

o microcomputers having the memory and calculating facililty to make effective use of complex statistical and data management programs on large data sets;

o the SPSS and MINITAB statistical packages, related graphics programs, relational data base programs, and data communication programs;

o data files, some from each of the several disciplines, containing real information of significant current interest to social scientists; and

o lab assistants trained in the technical details involved in running the several programs against the various files.

Bruce R. Thomas	CSI-8650634
Department of Physics & Astronomy	$19,790
Carleton College	Physics
Northfield, MN 55057	30 months

"Pulsed Nitrogen/Dye Laser System and Associated Instrumentation"

In response to the increasing significance of lasers in scientific research as well as in various industrial and communications applications, Carleton College is offering a new course, Quantum Optics, at the advanced undergraduate level dealing with the principles of operation of lasers. The Physics Department will buy a pulsed tunable dye laser system and associated fast, sensitive detection and analysis apparatus to support the laboratory work in that course. The students will study the details of the operation of the four major parts of the system, the nitrogen pump laser, the tunable dye laser, the amplifier, and the frequency doubling crystal. Two other courses that will be enhanced significantly by the equipment are Contemporary Experimental Physics and Project Laboratory. In those courses students will perform laser-based experiments in atomic and molecular physics.

Deborah W. Mascioli	CSI-8650685
Department of Biology	$23,441
College of St. Catherine	Biology
Saint Paul, MN 55105	30 months

"Equipment for Incorporating Cell Culture Procedures into Undergraduate Biology Laboratories"

This project will provide the Department of Biology at the College of St. Catherine with equipment for the in vitro growth, quantification and observation of higher eucaryotic cells. Acquisition of this equipment will allow them to: (1) expand the scope of previous laboratory exercises in Immunology, Microbiology, Genetics and Physiology to include areas such as animal virology, cellular immunology and somatic cell genetics; (2) provide students with hands-on experience with modern biotechnological equipment; and (3) encourage student research projects. The bulk of the equipment requested is for cell culture work. This includes two tissue culture hoods, two inverted phase contrast microscopes, a carbon dioxide incubator and a liquid nitrogen cell storage freezer. Additionally, two fluorescent microscopes will facilitate observation of immunofluorescently stained cells. The project will take advantage of the training of two recently appointed faculty members who, with this equipment, will be able to introduce important new modern biological work into the curriculum, thus advancing this Department's already strong record for supporting the education of women in science.

John R. Matachek	CSI-8650454
Department of Chemistry	$38,891
Hamline University	Chemistry
Saint Paul, MN 55104	30 months

"Introduction of a Computer-Controlled Gas Chromatograph/Mass Spectrometer (GC/MS) into the Chemistry Curriculum"

This project introduces into the chemistry curriculum at Hamline University a benchtop GC/MS complete with computer operating system and software. The use and applications of this instrument are introduced into the curriculum at several levels, affecting a wide range of science students. The GC/MS is utilized in six undergraduate laboratories and undergraduate research.

Specific course improvements include the enhancement of traditional qualitative organic analysis, the computer-controlled acquisition and processing of data, applications of the technique of thermolysis to the characterization of polymers and polymerization kinetics, analysis of hazardous waste and environmental samples, and the characterization of synthesized compounds in the advanced inorganic and organic laboratories.

David A. Lanegran	TPE-8552384
Macalester College	$105,230
Saint Paul, MN 55105	Geography
	18 months

"The Minnesota World Regional Course Project"

This project will deliver in-service training to teachers of geography. Thirty teachers, grades 6-10, will be selected from Minnesota and Western Wisconsin.

During the program the participants will take two graduate courses, Advanced Regional Geography and Curriculum Development Workshop. Each participant will produce six modules for use in world-regional and North American geography courses.

Preference for admission into the program will be given to teams made up of both elementary and secondary school teachers. Such teams will be expected to be involved in improving geographic education at all levels in their district's curriculum.

The participants will attend a three-week Workshop during the summer of 1986 and our all-day follow-up sessions during the academic year.

In addition to the main components of the program, co-curricular activities will be arranged so that the participants can meet their peers from Japan who will be at Macalester attending an institute for teachers of English.

Charles C. Torrey	CSI-8650324
Department of Psychology	$14,045
Macalester College	Psychology
Saint Paul, MN 55105	30 months

"Vision Laboratory for Undergraduate Psychology Instruction"

The goal of this project is to assemble and deploy the basic components of a well-equipped vision laboratory, to support teaching and undergraduate research in a broad range of visual processes. Major equipment items include a radiometer/photometer, an optical bench and accessories which can be configured as a two-channel Maxwellian view system, a grating monochrometer for studying wavelength effects on vision, and a versatile system for testing contrast sensitivity effects. Provision is made in the project for computer control of experimental procedures and data acquisition.

The equipment has been selected primarily for laboratory projects and classroom demonstrations in a course on Sensory Processes, and for pursuit of independent research and honors projects by advanced students. In addition, the equipment will be used in such other teaching contexts as Introductory Psychology, Neuroscience and Perception, and the Psychology Department's program for Junior majors.

Psychophysics is one of the most easily communicated areas of experimental psychology, offering startling perceptual phenomena, but it is rarely encountered in undergraduate teaching programs. Thus this project, while basic in its scope, is expected to have a substantial impact upon the curriculum.

Frederick E. Goetz	CSI-8650940
Department of Biology	$41,579
Mankato State University	Biology
Mankato, MN 56001	30 months

"Acquisition of a Highly Instrumented Fermentation Facility to Improve the Undergraduate Biotechnology Program"

This project will improve undergraduate laboratory work in Biotechnology by providing a highly instrumented fermentation facility which permits senior-year majors to scale up their projects from a single laboratory flask to an on-line production level.

While biotechnology is a diverse interdisciplinary field, its origins are in biology. Mankato's Biology Department has played the leading role in defining and developing what will constitute the major program in biotechnology. Mankato State University students complete a rigorous selection of courses in biology, chemistry and physics prior to the senior year of the program.

During the senior year the students are involved in classes and laboratories that address one of the major problems in the discipline: "scale-up". To accomplish this, students enroll in a three-quarter sequence entitled Biological Engineering Analysis and concurrently in a Biotechnology Laboratory. The former introduces the student to the analytical aspects of scaling up a bioconversion and the latter requires the student to apply these principles in the design and execution of a project. More specifically, students will work in teams on a project of interest to a faculty member or a sponsoring industry, and will be responsible for isolating/constructing an organism that carries out a bioconversion, and then scaling up the process. Students will have hands-on use of this highly instrumented fermenter facility, using their engineering skills to optimize and scale up their projects.

Steven L. Kipp	CSI-8650921
Department of Mathematics/Astronomy	$50,000
Mankato State University	Physics
Mankato, MN 56001	30 months

"A Professional Quality Teaching Telescope"

The Astronomy Group of Mankato State University will expand its observing facilities by adding a 16-inch telescope to Standeford Observatory. The telescope will be housed in a new five-meter dome at the present Observatory site. The telescope will be used primarily to train advanced students in astronomical research techniques and telescope use.

The 16-inch telescope is an f/13.5 Cassegrain reflector built by Sigma Research Inc. It is microprocessor controlled and is able to use a variety of auxiliary instruments. Initially the telescope will be equipped with an astronomical camera and a photometer. Later a spectrograph will be acquired for use with the telescope. The Sigma 16 optical system is convertible to a Coude' optical configuration, and the microprocessor control system can be interfaced to a minicomputer.

Students in an Observational Techniques course will use the telescope to obtain astronomical plates for astrometric reduction, photometric data for photometric reduction and eventually spectrograms for spectrum analysis. The telescope will be used by students to conduct a modest research program. The area of this research will probably be variable star photometry. It is expected that this student research will yield publishable results.

Robert A. Higgins	CSI-8650578
Department of Electrical Engineering	$50,000
Saint Cloud State University	Engineering
Saint Cloud, MN 56301	30 months

"Analog and Digital Communications Engineering Laboratory"

This project will provide electrical engineering undergraduates with thorough training in modern communications engineering. Instruments to be purchased include apparatus to modulate, transmit, and detect radio-frequency signals by AM, FM, SSB, and a variety of digital techniques. They also include counters, oscilloscopes, spectrum analyzers, and noise generators to aid in the analysis of signals. Communications engineering has been emphasized less than some other fields of electrical engineering, yet electronic communication is vital to the operation of most electronic devices, particularly computers. Future communications networks will be required to perform better than existing systems, and students need to be trained in all major methods of communication in order to design these networks effectively.

Daniel J. Steck	CSI-8650673
Department of Physics	$25,450
Saint John's University	Physics
Collegeville, MN 56321	30 months

"Comprehensive Nuclear Spectroscopy Instructional Facility"

Saint John's University will purchase a germanium gamma ray detector, associated nuclear instrumentation electronics and a multi-channel analyzer, and an active-passive shield in order to conduct high resolution, low background spectroscopy experiments. The requested equipment, when combined with current Physics and Biology Department instruments, will provide a complete nuclear detection facility. The new systems will increase the resolution of the department's spectroscopy equipment to the level of present charged particle systems, thus enabling students to (a) see modern nuclear detection techniques in introductory physics and radiation biology courses, (b) do meaningful laboratory experiments at the intermediate through advanced levels, and (c) do higher quality nuclear physics-related senior thesis projects. The new equipment will free the present gamma spectroscopy system for wider use in the introductory and intermediate labs. It will help revitalize and expand the use of some current equipment such as a neutron generator and PDP11/73 minicomputer. Several new experiments are planned to familiarize students with the principles of high sensitivity spectroscopy.

Roger W. Kugel	CSI-8650698
Department of Chemistry	$16,080
Saint Mary's College	Chemistry
Winona, MN 55987	30 months

"Use of an NMR Spectrometer in an Undergraduate Chemistry Program"

The goal of this project is to strengthen the undergraduate chemistry program at Saint Mary's College through the use of a nuclear magnetic resonance spectrometer in the curriculum. Four courses (Organic Chemistry II, Physical Chemistry II, Quantitative Analysis and Chemical Research) will be revised to provide students with an opportunity to put NMR principles into practice through "hands-on" experience, both in class projects and in independent research. Use of the NMR spectrometer will complement the current chemistry program in which students use infrared and UV-visible spectroscopic methods as well as methods in chromatography and electrochemistry. Thus, integration of

NMR spectroscopy in the curriculum will give students a more complete preparation in the areas of instrumental practice and molecular structure determination.

Jerome Rademacher	CSI-8650434
Department of Physics	$17,044
St. Mary's College	Physics
Winona, MN 55987	30 months

"Updating the Training of Radiation Scientists"

Over the past 10 years, a special radiation training laboratory has been established and equipped through Used Nuclear Type Equipment grants, NSF grants, local school support, and industry donations. St. Mary's College has become a center of excellence in education in radiation sciences. This project fills certain important gaps in the instrumentation so that students can be properly prepared to enter the modern industrial and academic research laboratories.

A Mossbauer Spectroscopy system will allow students to learn the principles of this important technique which is being used widely to examine the surface structures of materials, particularly in radioactive waste disposal. A new multichannel analyzer will allow superior analysis and make full use of an existing intrinsic germanium detector. New sources of radiation will enable students to perform better experiments. Finally, monitoring equipment will enable the department to ensure that radiation sources are used safely.

Paul Zorn	CSI-8650912
Department of Mathematics	$36,157
Saint Olaf College	Mathematics
Northfield, MN 55057	30 months

"The Integration of Symbolic Manipulation Programs into Calculus"

The Mathematics Department at St. Olaf College will integrate symbolic, numerical, and graphical computing tools into its elementary calculus course. Department faculty will cooperate in teaching the first offerings of the revised courses, and in preparing and improving course materials appropriate to this goal. Grant money will be used to equip a symbolic computation laboratory, running SMP on nine graphics-capable terminals. These consist of a SUN 3/160M-4 central mode, two SUN 3/75-4 stations, and six Heath/Zenith computers with high-resolution graphics boards. The laboratory will be used by elementary calculus students to complete assignments designed to exploit a powerful, interactive symbolic computation program. By handling some of the routine operations, symbolic manipulation programs can allow students to see ideas beyond the computations of calculus. With the computing power to support treatment of discrete and numerical (as well as continuous) ideas, calculus instruction gives a truer picture of its subject, highlights calculus ideas, and makes more of calculus' power available to students.

Harvey Keynes University of Minnesota Minneapolis, MN 55455	TPE-8643362 $204,886 Mathematics 12 months

"A Model for Mathematicians to Impact Precollegiate Mathematics"

In this project 100 superior mathematics teachers will participate in an intensive summer program designed both to upgrade their existing content knowledge and to provide an introduction to new topics. Teachers will choose one course from among courses in Computer Science, Geometry, Problem Solving, Calculus and Probability/Statistics. Each course will meet 4 hours per day for 20 days. Selected teachers will also participate in monthly seminars during the academic year.

This project will be led by a group of outstanding mathematicians. Project staff members have experience as high school mathematics teachers and in developing programs for mathematics teachers. The project will lead to more knowledgeable and skilled mathematics teachers. Each applicant's school has agreed to permit the participating teacher to use model lessons developed in the summer in his or her classroom and to allow participants to provide in-service training to other mathematics teachers within their schools.

Harvey B. Keynes University of Minnesota Minneapolis, MN 55455	TPE-8550590 FY 86 $ 76,332 FY 87 $ 60,224 FY 88 $ 57,638 12 months

"Minnesota Mathematics Mobilization"

Minnesota Mathematics Mobilization is a statewide effort to broaden communication among mathematics teachers, leaders in research and industry, and governmental officials about issues concerning precollege mathematics education. It is intended to increase support for mathematics education in the state, to provide a statewide forum for discussion of mathematics education, and to provide a link between Minnesota mathematics education efforts and related national projects. The Mobilization will integrate resources into an effective human system of experts, making existing knowledge available to anyone who has need of it.

Specifically, the Mobilization will undertake the following activities:

1. Establish a statewide newsletter containing information on math education in Minnesota.
2. Hold several statewide meetings each year.
3. Establish a centralized statewide information resource (e.g., an "800" telephone number) to put teachers in touch with persons who could help with mathematical concerns.
4. Identify and support resource individuals in mathematics and mathematics education who are willing to provide help to others.
5. Provide public information, position papers, and expert testimony to inform diverse audiences about mathematics education.
6. Promote the growth of speaker bureaus, monitored by regional contact persons in various sectors of the state.

Stephen C. Hedman
Department of Biology
University of Minnesota-Duluth
Duluth, MN 55812

CSI-8651017
$45,907
Biology
30 months

"Instrumentation for Recombinant DNA Instruction in the Undergraduate Biology and Microbiology Curricula"

Faculty in the Departments of Biology and Microbiology are undertaking a significant enhancement of courses in Molecular Biology, Microbiology, and Genetics. The vehicle by which this advance is being achieved is the introduction of recombinant DNA techniques into selected courses, one of which is entirely new. Concomitant with this is a greater integration of the teaching activities of the Biology and Microbiology Departments.

The degree in which recombinant DNA technology has advanced in recent years makes it quite feasible to teach techniques of gene manipulation to advanced undergraduate students. This provides both a body of knowledge and technical skills which should enhance the competencies of these undergraduates. It also provides the necessary basis on which many of the undergraduates could make a decision regarding further study in graduate school. As recombinant DNA technology permeates more areas of biology and is applied to an expanding number of disparate problems, knowledge of it becomes increasingly necessary in the undergraduate curriculum. The equipment provided through this award will enable the faculty to employ their biotechnology skills more effectively in their teaching -- to the great advantage of the curriculum.

A. Dean Hendrickson
University of Minnesota
Department of Instructional Science
1919 University Avenue
St. Paul, MN 55104

MDR-8550460
FY 86 $140,402
24 months

"Meaningful Mathematics - An Activity Program, K-6"

This project will develop innovative instructional materials for an activity centered mathematics curriculum for grades K-6. In this curriculum, the textbook is replaced by direct and active student experiences with manipulative materials, accompanied by verbally presented problems and situations. Learning is reinforced through the use of worksheets. Children work individually on some tasks and in small groups on others. The sequence of concept development in this curriculum differs significantly from the standard sequence. For example, the concept of fraction is introduced in kindergarten, as is geometry. Place value development begins in grade one. Logic is introduced in grade two, and the concept of function is introduced in grade four. In general, more time than usual is spent on concept development.

Preliminary materials for grades K-4 have already been developed with support from the Minnesota Council on Quality Education. Associated workshops for teachers have been funded by both NSF and the Department of Education. The preliminary materials have been used successfully in a variety of locations. It appears that they are particularly successful when used with Native American children. This grant will support the revision of the materials for grades K-4, in preparation for wider dissemination, and it will support the development of similar materials for use in grades five and six.

Van D. Gooch	CSI-8650751
Department of Biology	$6,375
University of Minnesota-Morris	Biology
Morris, MN 56267	30 months

"Luminescence Detection: Advanced Studies in Cell and Molecular Biology"

This project greatly enhances the laboratory experience of undergraduate biology students at the University of Minnesota at Morris by providing a microprocessor-controlled luminometer. Undergraduate students often need quick, exciting, safe, and successful projects that represent the state-of-the-art technology in order to first appreciate the rewards of doing research. Great improvements are being made in this department's ability to meet these goals by developing several projects centered around new technologies involving luminescence detection. The kinds of projects involve:

a) quantification of bioluminescent phenomena in whole organisms, cell fractions and biochemical fractions (fireflies, luminescent algae, and luminescent bacteria are readily available);

b) quantification of ATP in cell fractions after being exposed to various conditions (luminescence using firefly luciferase is by far the most accurate and sensitive method known for measuring ATP);

c) quantification of several enzyme activities by following NADH concentration in cellular fractions (commercially available bacterial luciferase can be used as a sensitive method of detecting NADH and related compounds); and

d) detection of antibodies using commercially available luminescent tags.

The experiments described here are so far superior in cost effectiveness and safety to the radioisotopic methods usually employed in this context that the grantee is being urged to publish them for wide dissemination among college biology faculties. The approaches supported through this grant are expected to significantly improve undergraduate biology laboratories at the University of Minnesota at Morris and potentially to have value on a national scale.

Joseph J. Latterell	CSI-8651065
Department of Chemistry	$24,575
University of Minnesota-Morris	Chemistry
Morris, MN 56267	30 months

"Nuclear Magnetic Resonance (NMR) Spectrometry in the Chemistry Curriculum"

This project will enhance the chemistry education of undergraduate students at the University of Minnesota--Morris by providing laboratory experience with NMR spectrometry. The project is aimed primarily at chemistry majors, but also will serve a large number of students in other science and preprofessional programs. A 60-MHz NMR spectrometer with spin decoupler and variable temperature capability will be used by students in organic, analytical, and physical chemistry laboratories and undergraduate research. In laboratory courses, students will study characteristic NMR phenomena such as chemical shifts, spin-spin coupling, spin decoupling, linewidths and relaxation times, and will discover how these are applied to the elucidation of molecular structure, to problems of quantitative analysis, and to the study of chemical kinetics. Student researchers will use the instrument in their projects dealing with chemistry of natural products, including those with potential medicinal value.

MISSISSIPPI

Presidential Awards for Excellence in Science and Mathematics Teaching

Susan J. Barnes
Mathematics
Biloxi High School
Biloxi, MS 39530

JoAnne A. Reid
Science
Weir Attendance Center
Weir, MS 39772

Richard S. Myers	CSI-8650351
Department of Chemistry	$12,714
Delta State University	Chemistry
Cleveland, MS 38733	30 months

"Liquid Chromatography in the Undergraduate Chemistry Curriculum"

This project is designed to improve the quality of learning in several undergraduate analytical chemistry courses at Delta State University, and to increase significantly the number of relevant research projects available to undergraduate chemistry students. These improvements are built around the acquisition of a high performance liquid chromatograph (HPLC), a modern, highly sensitive analytical instrument. Experience with the computer-controlled instrument operation and data analysis will enable students in analytical chemistry courses to perform better in local industry and in graduate study. New experiments performed by students in the teaching laboratories include the analysis of analgesic tablets, and analysis of plant material for chlorophyll and carotene. HPLC will complement and expand several undergraduate research projects, including those of local environmental significance. Specific research topics are related to the composition of acid rain, analysis of soil and water for pesticides, the fate of herbicides in the environment, and the isolation of rare inorganic species.

Bessie L. Tucker	TPE-8550976
Jackson State University	$136,321
Jackson, MS 39217	Mathematics
	12 months

"Meeting Teachers - Mathematical Needs in the Modern Technology: A Mathematics Recruitment/Recertification (MTRRP)"

This project will upgrade the mathematics skills and teaching techniques of teachers of grades K through 6. The project consists of courses and activities offered at two levels. Level I courses and activities are offered for teachers from grades K-3 and Level II courses and activities for teachers from grades 4-6. Twenty different participants will be selected for each of these two levels during both 1986-87 and 1987-88. Participants will be selected from within a 50-mile radius of Jackson State University.

The program for each level will consist of both academic-year workshops and a summer workshop. The academic-year component will consist of twelve evening sessions each semester and nine Saturday sessions. During the evening sessions the participants will work with course content and methodology. During the Saturday meetings the participants will discuss and share ideas regarding methods employed to effectively implement their experiences. Experts in the areas of teaching techniques and computer and calculator use, will be invited as guest lecturers. Principals and superintendents will be invited to attend the Saturday sessions.

During the summer workshop, teachers will work one-on-one with elementary school students. Emphasis will be placed on recognizing individual differences and adapting teaching methods to such differences, on relating to learners with different interests and backgrounds, and on planning and using a variety of teaching methods.

Elizabeth Hartfield
Mississipi Museum of Natural Science
111 N. Jefferson
Jackson, MS 39202

MDR-8550940
FY 86 $ 40,182
FY 87 $ 41,148

"Museum Activities Coordinated with 3-2-1 Contact"

The Mississippi Museum of Natural Science (MMNS) will develop a program over the next two years aimed at teachers and students in grades 3-7. The project will develop teacher kits and "hands-on" exhibits tied to the new state curriculum and to the science television series "3-2-1 Contact".

The MMNS is a division of the Mississippi Department of Wildlife Conservation and is designated as the official natural science museum by the State Legislature. The Museum has been in operation for 50 years and, since its inception, has served as a resource for classroom teachers. Mississippi has approximately 500,000 public school students attending about 1,000 schools. One third of these children are considered to live below the poverty level and 50 percent are from minority groups--a priority for the NSF.

The MMNS has had success with a small pilot project which coordinates science concepts taught in the television series "3-2-1 Contact" with exhibit programs at the Museum. Over the next two years MMNS will expand their "hands-on" exhibits and develop science kits for use in the classroom in coordination with the new state curriculum and the television series. The kits will include museum objects, suggested activities and a teacher's guide. During the first year a series of "Contact Days" will be held with teachers and students across the state to develop and test the effectiveness of the project along with a lecture program by minority and women scientists. During the second year the exhibits will travel to schools across the state.

Dennis Strete
Tougaloo College
Tougaloo, MS 39174

TPE-8651459
$96,345
12 months

"Precollege Teacher Development and Incentives"

Tougaloo College has planned an intensive program of activities scheduled for three weeks in the summer of 1986 followed by 14 biweekly Saturday workshops during the academic year. The program focuses on updating the biology, chemistry, physics, mathematics, and computer science backgrounds of 30 creative instructors with multicourse teaching assignments in small towns in central Mississippi.

MISSOURI

Presidential Awards for Excellence in Science and Mathematics Teaching

Sheri C. Adams
Mathematics
Truman High School
Independence, MO 64055

Sue A. Nothstine
Science
South Nodaway R-IV Schools
Barnard, MO 64423

Fellowships

University of Missouri - Columbia Columbia, MO 65211 Graduate Research Fellowships Support Grants	$4,100
Washington University Saint Louis, MO 63130 Graduate Research Fellowships Support Grants	$127,780

Sr. Marie Joan Harris	CSI-8650799
Department of Chemistry	$7,175
Avila College	Chemistry
Kansas City, MO 64145	30 months

"Electrochemistry in the Undergraduate Curriculum"

The goal of this project is to improve the analytical chemistry education of undergraduate students at Avila College. In recent years there has been great expansion both in the variety and utility of electrochemical methods of analysis and in the development of equipment controlled by microprocessors. Through this project students will work with a Bioanalytical Systems electrochemical analyzer, and will gain first-hand laboratory experience with modern microprocessor-controlled instrumentation capable of performing seventeen different methods of electrochemical analysis. Students in instrumental analysis, physical chemistry, organic chemistry, biochemistry, and undergraduate research will use this versatile instrument for a variety of applications, including comparisons of pulse and cyclic voltammetry, use of DC polarography for analysis of vitamins, comparisons of different types of electrodes, and kinetic studies.

Michael H. Powers	TPE-8650101
Central Missouri State University	$19,977
Warrensburg, MO 64093	12 months

"Teachers, Industry and Environment"

The planned project, which is a cooperative effort of Central Missouri State University, the Missouri Chemical Council, the Missouri Department of Elementary and Secondary Education, and the Missouri Department of Natural Resources, is designed to provide professional growth opportunities for qualified secondary school teachers of chemistry in Missouri. A weekend meeting with chemists, engineers, and educators will provide participants with the opportunity to learn about the state's chemical industry and its interface with the environment. In a subsequent drive-in conference, participants will design, develop, and report on a related teaching or research project.

Kenneth D. Laser	TPE-8550926
Missouri Botanical Garden	$141,348
Saint Louis, MO 63166	Environmental
	36 months

"Summer Institute in Environmental Science"

This project will improve the knowledge and teaching background of teachers. The program will provide 90 hours of instruction in environmental science and ecology. Five environmental concepts will be explored during the 24-day period. Each week's instruction will include guest lectures, hands-on workshops, field trips, and interviews with community leaders.

The course will meet daily throughout the month of July. Participants will be required to submit a group project as part of the Summer Program. The results of the activity will be presented to all participants of the program.

Participants will be K-12 teachers from the St. Louis metropolitan area. A minimum of three years teaching experience is required. Participants must have approval from their supervisory or principal to attend and release time for a post-institute day.

Vincent E. Kurtz	CSI-8650633
Department of Geosciences	$50,000
Southwest Missouri State University	Earth Sciences
Springfield, MO 65804	30 months

"The Use of Digital Systems to Improve Cartography and Map Technology"

Improved instruction in cartography and map technology is being accomplished through the recent acquisition of digital system instrumentation for the existing mainframe computer. The digital stereo restitution instrument adds time-effective instruction in photogrammetry for exercises involving mensuration and aerotriangulation. The digitizer permits the addition of digitizing techniques to the Introductory Cartography course, and is used as an integral part of instruction in Advanced Cartography. The interactive editing station gives students in Advanced Cartography and Photogrammetry experience in contemporary editing techniques. The mainframe, by producing output on the graphics plotter, provides a substantial improvement in computerized mapping instruction.

Jeffery Bonner
St. Louis Science Center
5050 Oakland Avenue
St. Louis, MO 63110

MDR-8651996
FY 86 $274,098
12 months

"Science Park: A Scientific Playground"

The St. Louis Science Center is a major metropolitan science museum serving a population of 2.3 million people. One year ago they moved into a new facility at a new location and attendance at the museum has tripled, reaching 600,00 visitors this past year.

The center will develop a "Science Playground" in order to teach basic science principles and process through a series of 45 outdoor participatory exhibitions around the major areas of motion, energy, light, sound and the natural environment. The physics of motion will be explored through exhibits such as a friction slide, lunar gravity swing, double-axis human pendulum, etc. Energy exhibits will provide experiences with watermills and water power, fulcrum leverage and solar energy. Light exploration includes a solar column, prisms and rainbows, soundwheel and whisper discs. A weather station will have a rain gauge, anemometer, a variety of barometers, etc.

This contemporary playground concept was developed as a response to limitations of indoor facilities and to extend use of outdoor space in a creative manner. The exhibit will be a model for extending science learning opportunities for schools, parks, other science museums and similar institutions. The center surveyed 31 science centers, 82 parks and 85 school districts to gauge interest in use of science playground exhibits, and found a clear interest in this type of project by all sectors surveyed. Exhibit designs will be published and furnished at cost to any facility wishing to replicate all or any part of the exhibition.

Harris M. Cooper
Department of Psychology
University of Missouri-Columbia
Columbia, MO 65211

MDR-8550343
FY 86 $35,311
18 months

"The Effects of Homework on Science and Mathematics Achievement and Attitudes: An Integrative Research Review"

The practice of requiring students to carry out academic tasks during nonschool hours is as old as formal schooling. Assessments of the value of homework, however, have fluctuated over time with strong positive opinions prevailing at the turn of this century and the early 1960's and negative opinions holding sway in the 1930's and 1970's. Recently, in response to calls for higher standards of excellence in American education, schools have begun to place increased emphasis on homework as a means for improving student performance.

Opinions of homework and its utility have never been greatly influenced by empirical data on the subject. This is due partly to a general lack of public information on what research says about homework and partly to the seemingly contradictory findings of studies.

The purpose of this project is to locate, describe, summarize, and integrate the empirical research concerning the effects of homework on numerous student outcome variables. Outcomes will include all the dependent measures employed in previous research, with special attention paid to academic achievement, attitudes toward school, and study habits. The review will go beyond previous reviews by
(1) including the most recent research; (2) paying the greatest attention to schooling, homework, and research method characteristics that might mediate the effects of homework; (3) focusing on homework effects on different subject matters, with special attention paid to science and mathematics; and (4) employing quantitative synthesis techniques to estimate the impact of homework and uncover any subtle homework effects.

Thomas L. Good
Douglas Grouws
Center for Research in Social Behavior
University of Missouri-Columbia
Columbia, MO 65211

MDR-8550619
FY 86 $157,948
FY 87 $173,349
FY 88 $ 46,577
24 months

"Small-Group Instruction in Mathematics: Naturalistic Research in Teaching and Learning"

This systematic research project of classroom teaching and learning of mathematics in grades 3 through 6 is intended to : (1) describe teachers' beliefs about small-group mathematics instruction with a particular interest in specifying mathematical content that is especially appropriate for small-group instruction; (2) identify instructional strategies teachers use during small-group instruction; (3) replicate those instructional strategies in different educational contexts; (4) examine small-group instruction in the areas of problem solving, estimation, and measurement (making videotapes of these lessons as well as coding classroom behavior); (5) examine the correlation between different small-group instructional strategies and students' mathematics performance; (6) with the assistance of the National Advisory Board, develop at least two innovative treatments for improving the effectiveness of small-group mathematics instruction; and (7) disseminate the results of the project in a monograph discussing research findings and concepts and in a videotape(s) that will illustrate effective practices.

Gary Nahrstedt
Larry DeBuhr
University of Missouri
Kansas City, MO 64110

TPE-8550892
FY 86 $ 78,994
FY 87 $ 83,412
FY 88 $ 85,973
36 months

"Metropolitan Kansas City/Elementary Science Specialists"

This Leadership Activities project will provide professional development for 90 leadership teachers who will become a cadre of Elementary Science Specialists over a period of three years. They will provide leadership for the improvement of elementary science education throughout metropolitan Kansas City, a bistate metropolitan area with 12 cooperating school districts at this time. The proposal is the product of a sustained, cooperative planning effort that has spanned more than one year. The project will include working with classroom teachers and with principals to enhance the quality and quantity of science education in elementary schools. The program features an innovative course of study integrating science content with instruction that is appropriate for elementary school classrooms. It includes workshops for principals, supervised internships in schools, and in-service activities conducted by the leadership teachers throughout the participating school districts.

The program involves considerable support, planning, and cost-sharing from the cooperating school districts. This cooperation provides some unique opportunities to involve a variety of community institutions including the Kansas City Zoo, The National Energy Foundation, and the Science Pioneers. Careful evaluation is planned that will provide important feedback to the project directors, to the cooperating school districts, and to the teachers involved. This model for teacher enhancement may also serve as a prototype for the development of more appropriate approaches to the science preparation of preservice elementary teachers at the University of Missouri, Kansas City.

MONTANA

Presidential Awards for Excellence in Science and Mathematics Teaching

Shirley A. Johnson
Mathematics
North Junior High School
Great Falls, MT 59401

Craig R. Kuchel
Science
Florence-Carlton District 15-6
Florence, MT 59833

Lyle Anderson	TPE-8550900
Montana Council of Teachers of Mathematics	$350,710
Billings, MT 59101	Computer
	36 months

"Integrating Mathematics Programs Computer Technology (The IMPACT Project)"

This Leadership Activities project will provide enhancement and professional development experiences for 30 Montana mathematics teachers, grades 7-12, who will be selected on the basis of geographic distribution and leadership ability to become regional mathematics teachers and present workshops throughout the state.

The IMPACT project's main goal is to develop a leadership program for mathematics teachers (7-12) that will result in a comprehensive statewide in-service program for mathematics teachers in these grades. Two two-year summer institutes featuring mathematics content and the use of computers as a regular component of the mathematics curriculum will be conducted. A carefully selected set of computer software specifically related to those topics ordinarily found in the 7-12 mathematics curriculum will be evaluated and organized for classroom use. Thirty teachers will be trained and 30 new teachers will be added the second year. These qualified leaders have the potential to impact 5000-8000 workshop participants over a five year period, thereby covering most of the state. This program will provide an opportunity for teachers who are expected to teach all 7-12 mathematics to learn about and use software at both the junior and senior high school levels. It has a wide cross-section of involvement including the private sector, the Office of Public Instruction, local schools, the State University system, and professional organizations.

Daniel T. Dolan	TPE-8643363
Montana Council of Teachers of Mathematics	$292,348
Billings, MT 59101	12 months

"Excellence for Montana Mathematics Education"

This project is developing a model program for the in-service training of elementary school teachers for employment in a large geographic region with a sparse population. The project is designed as a comprehensive statewide program to assist local school districts in Montana in providing high quality continuing education opportunities in mathematics for elementary teachers.

Six-week training sessions will be held each summer at the University of Montana and at Montana State University for the purpose of preparing carefully selected teachers from grades K-8 to become regional mathematics in-service leaders. The complete training program will take two summers; the first session will be held in Summer 1986. Following training, the regional mathematics leaders will present in-service workshops in districts throughout the state. The workshops will be planned and presented with the cooperation of the university faculty who taught the training sessions. The first year of the project was devoted to planning and recruitment for the summer session. Funding for FY 1986 will cover the follow-up for the first summer, planning for the second summer, and the second summer activities.

NEBRASKA

Presidential Awards for Excellence in Science and Mathematics Teaching

Charles R. Lang
Science
Omaha Westside High School
Omaha, NE 68124

John C. Waterman
Mathematics
Central High School
Omaha, NE 68102

Fellowships

University of Nebraska - Lincoln Lincoln, NE 68588 Graduate Research Fellowships Support Grants	$16,350

Carl Sterner	CSI-8650833
Department of Chemistry	$25,725
Kearney State College	Chemistry
Kearney, NE 68849	30 months

"A Gas Chromatograph/Mass S[ectrometer for Undergraduate Chemistry"

The Chemistry Department at Kearney State College will purchase a computer-controlled gas chromatograph/mass spectrometer to update and enhance the chemistry education of its undergraduate students. The instrument will be used for demonstrations in two courses for non-science majors, and will be used by students in several courses for majors: organic chemistry, organic qualitative analysis, instrumental methods, and student apprenticeship. Projects include investigations of agricultural pesticide residues, industrial wastes, and other environmental chemical hazards. Acquisition of this instrument will also allow faculty to implement their plan to develop and publish mass spectrometry experiments for undergraduate laboratory courses.

Roger L. Carlson	TPE-8650022
Kearney State College	$129,014
Kearney, NE 68849	Life/Earth/Physical
	12 months

"Materials Development for Middle/Junior High School Teachers"

The program is designed as an eight-week session for 40 middle/junior high school (5th-9th grade) teachers. The basic purposes for the summer program are:

1. To develop curricular materials: Inquiry Role Approach laboratory activities and schoolyard science activities.
2. To improve the academic background of the teachers in three areas: life science, earth science, and physical science.

The style of instruction will involve laboratory activities, discussions, lectures, and schoolyard field trips. The Inquiry Role Approach, a successful teaching strategy utilizing three-member laboratory teams, will be the major teaching strategy used for the physical and earth science areas. In the life sciences, emphasis will be placed on schoolyard field trips and the individualization of laboratory activities.

Follow-up activities will include: a fall and spring meeting following the workshop to discuss results of training; in-service training events conducted by participants for science teachers in local schools. The college staff will visit each school to continue communications with middle school teachers.

Paul Schupbach/Jack Mcbride
Nebraskans for Public TV
P.O. Box 80669
Lincoln, NE 68501

MDR-8550948
FY 86 $200,000
FY 87 $200,000

"Reading Rainbow"

READING RAINBOW is a 25 part PBS children's television series produced by the Great Plains National Instructional Television Library, a part of the Nebraska Educational Television Network.

It addresses the national problem of more and more youngsters reading less and less. This award-winning television series has been successful in using television to stimulate children ages five through nine to read good books. The series attracts an audience of 7.8 million children with ratings equal to those of THE ELECTRIC COMPANY and MR. ROGERS' NEIGHBORHOOD. Program evaluation shows equally enthusiastic responses from parents, teachers, librarians and, most importantly, children.

Support will be provided for a series of five READING RAINBOW programs which focus on scientific themes. These episodes will be integrated into the ongoing series and build on young children's curiosity and interest in the world as well as demonstrating to children how science relates to all aspects of their lives. In an increasingly technological society, children need stimulation to seek out books related to science, reinforcing early curiosity and strengthening life-long interest in science.

Women and minorities are well represented on READING RAINBOW staff and in the productions themselves. Great care is taken to ensure a broad representation of people including racial and cultural groups, female and male, senior citizens and people with varying physical disabilities.

Community outreach organizations involved include: the National PTA, American Booksellers Association, American Library Association, National Educational Association and the International Reading Association. In connection with the science series, Reading Rainbow staff will involve the National Science Teachers Association and a special public relations effort will be organized to promote READING RAINBOW to science museums and other organizations that conduct science education program activities for children.

Donald W. Miller
University of Nebraska
Lincoln, NE 68588

TPE-8550604
FY 86 $239,135
FY 87 $230,000
FY 88 $230,000
Mathematics

"Nebraska Mathematics Scholars Program for Secondary School Teachers"

This Leadership Activities project will provide enhancement and professional development experiences for 60 exemplary secondary school mathematics teachers from rural Nebraska school districts. The overall goals of the multiyear project involve: 1) the updating and deepening of the participants' mathematics backgrounds and teaching methodologies, 2) the networking of the participant Fellows, six outstanding secondary mathematics teachers selected to be part of the project staff as Senior Fellows and the six university and college mathematics faculty, 3) the conduct of implementations of problem-solving lessons in participants' classrooms, 4) the conduct of at least four all-day in-service workshops by the participants for their colleagues in their home schools, 5) appropriate recognition for honors teacher participants, 6) the dissemination of the project methods, materials and results to nearby school systems and rural states, and 7) the investigation of the modelistic approach within a carefully planned documentation, assessment and evaluation effort.

Selections of the 60 project Fellows and six Senior Fellows will be based upon detailed applications requiring expressions of teacher and school commitments to implement project emphases. Twenty Fellows, two Senior Fellows and two professors will study together at each of three sites (UN-Lincoln, Chadron State College, and Hastings College), all completing a similar program of professional development after three years which will include 6 graduate mathematics courses, 3 computer seminars and 3 dissemination seminars (24 graduate credits from UN-Lincoln). The participants will complete a five-week intense residential workshop each summer, rotating as a group to a different campus each summer. Participants will be visited and observed in their classrooms and in their workshops with their peers, and each will prepare a videotaped session to be shared with project staff and participants. Careful documentation and analysis of these observations and of teacher reports will provide a significant basis for a detailed project evaluation, both by project staff and expert external evaluators.

NEVADA

Presidential Awards for Excellence
in
Science and Mathematics Teaching

Byllie D. Andrews
Mathematics
Incline High School
Incline Village, NV 89450

Jorge E. Sanchez
Science
K. O. Knudson Junior High School
Las Vegas, NV 89104

Don Diener
Department of Psychology
University of Nevada-Las Vegas
Las Vegas, NV 89154

CSI-8650433
$13,410
Psychology
30 months

"Creation of a Computer-Based Laboratory for Teaching Undergraduate Psychology"

The project involves the development of a computer-based laboratory to be used for instruction in cognitive and experimental psychology courses. The laboratory will expose students to the many methods employed and the important phenomena studied in the traditionally experimental areas of psychology, including cognitive, learning, and methodology. Furthermore, the opportunities to become familiar with the use of the computer as an integral part of their course work will equip students with the skills necessary to participate more fully in the research process.

NEW HAMPSHIRE

Presidential Awards for Excellence in Science and Mathematics Teaching

Laurie Boswell
Mathematics
Profile School
Bethlehem, NH 03574

Edward J. Hendry
Science
Pelham High School
Pelham, NH 03076

Fellowships

Dartmouth College Hanover, NH 03755 Graduate Research Fellowships Support Grants	$16,350

Ronald J. Tanenbaum	CSI-8650396
Department of Civil Engineering	$45,000
New England College	Engineering
Henniker, NH 03242	30 months

"A Universal Testing Machine in Undergraduate Engineering Instruction"

A Universal Testing Machine (UTM), recently acquired by New England College, is being used in laboratory portions of the engineering curriculum to measure such fundamental material properties as stress-strain behavior, Poisson's rates and modules of elasticity. Engineering students are thus being given the opportunity to study material properties more thoroughly and with a greater degree of accuracy, efficiency and sophistication. In addition, senior level students can now take advantage of individualized studies and projects utilizing the UTM. Through these activities, significant improvements in undergraduate engineering education are being implemented.

NEW JERSEY

Presidential Awards for Excellence in Science and Mathematics Teaching

Alice Olszewski
Science
Cherry Hill High School West
Cherry Hill, NJ 08002

Joan J. Vas
Mathematics
Matawan Regional High School
Matawan, NJ 07747

Fellowships

Individual Award for Foreign Tenure Graduate Research Fellowship	$2,775
Princeton University Princeton, NJ 08544 Graduate Research Fellowships Support Grants	$1,277,880
Rutgers Univeristy - New Brunswick New Brunswick, NJ 08903 Graduate Research Fellowships Support Grants	$32,700

Thomas L. Hilton
Educational Testing Service
Princeton, NJ 08541
609/921-9000 x 5784

SPA-8652096
FY 86 $228,313
18 months

"Persistence in Science of High Ability Minority Students"

A study will be conducted by the Educational Testing Service (ETS) of the educational progress of black, Mexican American, Puerto Rican, and American Indian students of high ability (scoring 550 or above on SAT math and scoring in the upper quartile on achievement measurement in HS & B) who intend to enroll in college and to major in mathematics, science, or engineering. Three cohorts will be studied: (1) the students in high school and beyond who were high school seniors in 1982 and subsequently were followed up at two-year intervals; (2) SAT-takers who were high school seniors in 1984; and (3) SAT-takers who were high school seniors in 1986. All the qualifying SAT-takers will be surveyed by mail and a randomly selected subsample of at least 100 in each cohort will be interviewed by telephone. The combination of cross-sectional and longitudinal data will permit an analysis of variables related to the progress of the persisters and non-persisters in each cohort at various time points. Whether these characteristics are changing will be of importance.

Edward Chittendon
Educational Testing Service
Division of Education Policy Research
  and Services
Rosedale Road
Princeton, NJ 08541

MDR-8470199
FY 86 $155,265
18 months

"Development of Science Materials for Beginning Readers: A Demonstration Project"

The purpose of this project is to develop materials for beginning readers (kindergarten to third grade) that will promote children's knowledge of and interests in areas of science while taking into account the tentativeness of their reading skills. Very little material is now available which meets these particular conditions. Not only will such material be of specific interest to many young readers, but it will enhance the competence of all children for understanding and appreciating the range of writing in science that they will encounter in the later grades.

The outcomes of the project will be twofold: (1) A prototype demonstration set of science books for beginning readers and (2) A project report that documents the development and effectiveness of the materials and provides guidelines and rationale for their use.

The project grows out of a program of classroom research on interests and learning styles of beginning readers which was conducted by ETS staff in collaboration with public school teachers. Research techniques developed in these previous studies will be used as a guide to constructing texts that have substantial science content yet are directly accessible to the beginner. The work of the project will entail collaboration with teachers, scientists and a writer.

Vincent P. Tomaselli	CSI-8650905
Department of Physics	$30,684
Fairleigh Dickinson University	Physics
Teaneck, NJ 07666	30 months

"An Undergraduate Optics Laboratory for Physics and Engineering Majors"

The Physics Department will develop a new undergraduate program in optics for students in physics and engineering. The program will consist of a sequence of upper division courses. For electrical engineering majors, the program will be offered as an option. For physics majors, the entire uppper division program can be structured to provide a strong optics concentration. Initially, the program will be offered by the Physics Department. Ultimately, courses will be offered by both academic departments and will be open to either group of students.

A major portion of the program is the development of a modern undergraduate, two-semester Optics Laboratory course. The first semester will emphasize traditional optical experiments which illustrate the principles of geometric and physical optics. In the second semester, contemporary topics in optical science and engineering will be treated. In both semesters, microcomputers will be used to interact with the optical components in selected experiments.

Datta V. Naik	CSI-8650248
Department of Chemistry	$10,195
Monmouth College	Chemistry
West Long Branch, NJ 07764	30 months

"High Performance Liquid Chromatography in Undergraduate Chemistry Laboratories"

The aim of this project is to improve chemistry instruction at Monmouth College by incorporating high performance liquid chromatography (HPLC) into the undergraduate laboratory curriculum, to complement separation theory taught in lecture courses. The HPLC instrumentation will be used by students in quantitative analysis, instrumental analysis, and organic chemistry laboratory courses, to gain direct experience with and appreciation for this powerful modern method of separation and analysis of compounds. Students will conduct analyses of "real-life" sample mixtures; determine effects of eluent composition, column temperature, and gradient elution; and monitor progress of organic reactions. The valuable experience gained with the theory, operation, and applications of HPLC will contribute to students' later success in the workplace and in graduate research.

Richard L. Beach	CSI-8650489
Department of Chemistry	$47,572
Rider College	Chemistry
Lawrenceville, NJ 08648	30 months

"A 90-MHz Nuclear Magnetic Resonance Spectrometer for Undergraduate Chemistry Experimentation"

Nuclear magnetic resonance spectroscopy is a technique at the forefront of chemistry, biochemistry, molecular biology, and medicine. This project will provide students at Rider College with a 90-MHz NMR for experiments in five major laboratory courses and for undergraduate research projects. Students majoring in chemistry, biochemistry, and biology will use the instrument, beginning in the sophomore year. Experiments integrated into the chemistry curriculum include investigations of strained polycyclic systems using carbon-13 NMR, application of NMR spectroscopy to studies of reaction kinetics, and structure determination of organometallic compounds.

Jonathan S. Griffiths	CSI-8651022
Department of Chemistry	$27,450
Stockton State College	Chemistry
Pomona, NJ 08240	30 months

"Integrating Fourier Trasform Infrared Spectroscopy (FT-IR) into the Chemistry Curriculum"

This project will give undergraduate chemistry students at Stockton State College the opportunity to work with a modern computer-controlled FT-IR system. The instrument will enhance substantially the laboratory instruction in Organic Chemistry, Physical Chemistry, and Laboratory Methods. Students completing their senior thesis requirement in chemistry will use the instrument in research projects. In addition, students in the biology, environmental studies, and physics programs will use the FT-IR system in laboratory courses and research. The FT-IR instrumentation and associated accessories and software will form the focus for introducing undergraduates to Fourier transform techniques, computer-controlled instrumentation, database searching, and computer-assisted data collection and manipulation. Diffuse reflectance and cylindrical internal reflectance accessories will allow students to explore the most modern sampling techniques for infrared spectroscopy.

Carolyn Q. Wilson	TPE-8550891
Woodrow Wilson Fellowship Foundation	FY 86 $370,008
Princeton, NJ 08542	FY 87 $350,000
	Chemistry
	12 months

"National Science Leadership Program"

This Leadership Activities project will provide enhancement and professional development experiences for 50 nationally selected secondary school chemistry teachers in each of three years. The overall goals of the multiyear project involve the updating and deepening of the participants' chemistry backgrounds and teaching methodologies, the networking of the participants with university science faculty, the conduct of planned in-service workshops by the participants in their home schools and area colleges, appropriate recognition for honors-teachers participants, the dissemination of the project materials and results nationally, the investigation of the modelistic approach within a carefully planned documentation, assessment and evaluation effort.

The summer leadership institutes will be held on the Princeton University campus. These will be staffed by four renowned university scientists/chemical educators and by an outstanding secondary school chemistry teacher with special expertise in computer applications to chemistry teaching. An advisory committee of distinguished scientists and educators will guide the planning of the program and the conduct of the evaluation and documentation activities. Participants will be encouraged to submit proposals for regional workshops conducted for other teachers; modest grants to support materials purchase and other costs will be available.

NEW MEXICO

Presidential Awards for Excellence in Science and Mathematics Teaching

Jon T. Black
Science
La Cueva High School
Albuquerque, NM 87113

James R. Owens
Mathematics
Albuquerque High School
Albuquerque, NM 87102

Fellowships

Individual Award for Foreign Tenure Graduate Research Fellowship	$17,100
New Mexico Institute of Mining & Technology Socorro, NM 87801 Minority Graduate Research Fellowships Support Grants	$16,350
New Mexico State University Las Cruces, NM 88003 Graduate Research Fellowships Support Grants	$16,350
University of New Mexico Albuquerque, NM 87131 Graduate Research Fellowships Support Grants	$82,500

Jeffry Gottfried
Don Croft
New Mexico Museum of Natural History
Department of Education
P.O. Box 7010
Albuquerque, NM 87194-7010

MDR-8550535
FY 86 $181,186
FY 87 $175,027

"Improving Natural Science Education in Rural Elementary Schools"

This project is a cooperative effort between the New Mexico Museum of Natural History and the Center for Rural Education of New Mexico State University. It brings together scientists and educators for the purpose of improving science education in rural elementary schools.

The project will develop hands-on kits and working models on a number of related topics. Kits will use locally available specimens, background material, scientific apparatus, and suggested activities to teach natural science concepts. Working models such as stream tables to demonstrate the evolution of landforms and terraria mini-environments to demonstrate ecological relationships will be developed. Teachers' manuals will be written and workshops offered to train teachers to properly use the kits. Teachers will also receive training in the development of additional kits specific to their local conditions. The materials will be designed for use with multi-cultural populations and will build upon existing knowledge of rural children. Activities also include the establishment of out-of-school natural science clubs.

Carol L. Stuessy
New Mexico State University
Las Cruces, NM 88003

TPE-8650111
$70,257
12 months

"Science Education Training for Elementary Principals and Teachers"

The College of Education of New Mexico State University is offering the opportunity for elementary school principal/teacher teams from rural school districts in New Mexico to upgrade their science education backgrounds and expertise. A four-week workshop will involve 30 participants in learning science concepts, science education methodology, science area content, and demonstration field trips. The teams will coordinate their efforts toward the development of units of work which will be shared among the whole group.

Follow-up activities include a series of on-site visits and conferences with teachers and principals. This project serves a rural, largely Hispanic area, and has a strong bilingual education component.

Kenneth H. Ladner	TPE-8550899
Western New Mexico University	$67,556
Silver City, NM 88061	Physical
	18 months

"Physical Science for Elementary School Teachers"

Western New Mexico University will provide the opportunity for 40 elementary school science teachers, grades K-6, from southwest New Mexico and southeast Arizona to upgrade their backgrounds in the physical sciences. A four-week workshop, which will include the areas of physics, chemistry, geology, and astronomy, will be held during the summer of 1986.

The teaching of science for inquiry will be stressed, and emphasis will be placed on a number of methods of teaching physical science that require investigative approaches by both student and teacher. The program will be liberally scheduled with laboratory and problem-solving activities and will provide time and support for independent study under faculty guidance.

The project director and instructor will provide follow-up support in classroom implementation of the science curriculum, in the development of a laboratory resource center, and the science in-service training program at the schools.

NEW YORK

Presidential Awards for Excellence in Science and Mathematics Teaching

Arthur Eisenkraft
Science
Fox Lane High School
Bedford, NY 10506

Lawrence J. Zimmerman
Mathematics
Brooklyn Technical High School
Brooklyn, NY 11217

Sharon L. Houp
Mathematics
Ramstein Junior High School
APO New York, NY 09012

Fellowships

CUNY System Office New York, NY 10021 Graduate Research Fellowships Support Grants	$32,700
Columbia University New York, NY 10027 Graduate Research Fellowships Support Grant	$251,200
Cooper Union New York, NY 10003 Graduate Research Fellowships Support Grants	$16,350
Cornell University Ithaca, NY 14853 Graduate Research Fellowships Support Grants	$989,770
Individual Award for Foreign Tenure Graduate Research Fellowship	$17,100
New York University New York, NY 10012 Graduate Research Fellowships Support Grants	$127,800
Rensselaer Polytechnic Institute Troy, NY 12181 Graduate Research Fellowships Support Grants	$61,370
Rockefeller University New York, NY 10021 Graduate Research Fellowships Support Grants	$130,800
Roswell Park Memorial Institute Buffalo, NY 14263 Graduate Research Fellowships Support Grants	$29,750
SUNY at Buffalo Buffalo, NY 14260 Graduate Research Fellowships Support Grants	$3,350
SUNY College of Environmental Science & Forestry Syracuse, NY 13210 Graduate Research Fellowships Support Grants	$16,350
Syracuse University Syracuse, NY 13210 Graduate Research Fellowships Support Grants	$32,700

Seth Chaiklin Center for Children & Technology Bank Street College of Education 610 West 112th Street New York, NY 10025	MDR-8651591 FY 86 $28,954 12 months

"The Psychology of Physics Problem Solving: Theory and Practice"

The past nine years have yielded a large research corpus on the psychology of physical-science problem solving. Several research approaches have developed analyses of problem solving in physical science, emphasizing such aspects as qualitative conceptions and search strategies. It is now appropriate to evaluate what we have learned and what remains to be done in developing a coherent theoretical approach that supports physical science education.

Funds are being provided for a four-part working conference that will enable major researchers in the area of physics problem solving and education to address this problem. The first part will attempt to confront and coordinate different research approaches to develop a core model of problem solving by novices in physics. The second part will develop the educational implications of the core model. The third part will critique the core model by considering what science educators need from a theory of problem solving to advance the effectiveness of physics instruction. In light of the critique, the fourth part will discuss methodological and conceptual approaches that would better coordinate psychological theory and educational practice.
The conference is scheduled to meet from July 21-23, 1986. Working papers prepared beforehand will be used to focus and initiate discussion. The results of the discussions will be disseminated through an American Educational Research Association symposium and three papers for appropriate research and education journals that summarize the current understanding of novice physical-science problem solving, the limitations of that understanding for educational purposes, and directions for future research.

Samuel Gibbon, Jr. Bank Street College of Education New York, NY 10025	TPE-8643359 $648,293 16 months

"Precollege Teacher Training Model in an Integrated Science-Mathematics Program Utilizing Instructional Television and Microcomputing"

This project is designed to develop and implement a teacher training model that focuses on the effective use of the Voyage of the Mimi materials in elementary and middle school classrooms. During the first 12 months of the project, 20 teachers and 7 staff developers from each of four New York metropolitan area school districts were trained to use the Mimi materials. Following the training at Bank Street, extensive observation and in-school support was provided by project staff.

During the second year, teams of staff developers and teachers from 8 sites nationwide were invited to participate. This was an attempt to test the transportability of the teacher training model. Followup support of this group has included visits, telephone calls, correspondence and extensive electronic networking.

The final 16 months of the project will be devoted to dissemination and demonstration of the teacher training model which has been conceptualized, implemented and evaluated over the first two years. Research conducted so far has shown that teachers can use the Mimi materials effectively in their classrooms, students find the materials to be highly motivating, and students in the program are learning science and mathematics. The specific goals for this final aspect of the project are:

a) To formulate partnerships between State Education Departments, colleges/universities, regional professional organizations, and school systems that would support the application of the MASTTE model to local practices.

b) To develop a video and print-based package of information concerning the model that could be used by teacher educators in a variety of institutional settings.

Harold L. Stolov	TPE-8550532
City College	$279,992
New York, NY 10031	Physics
	24 months

"Comfortable Physics Workshops for Elementary School Teachers"

This project will deliver in-service training to 75 elementary school teachers each year for a period of two years. Participants will be drawn from several School Districts in New York City. The aim of the program is to improve physical science literacy and to provide techniques and strategies for the inclusion of current hands-on materials into classrooms.

Two workshops will be conducted. Comfortable Physics Workshop I will introduce and explain those topics necessary to make elementary teachers comfortable with physics.

Comfortable Physics Workshop II will bridge the gap between the physical concepts and the laboratory apparatus of Workshop I and the elementary school classroom.

Workshop participants will meet for three hours each week for 15 weeks during the school year--more often during the summer months.

In addition to lecture, lecture demonstrations, and hands-on laboratory work in both workshops, a project will be required of each participants.

Alfred Posamentier	TPE-8550991
City College of CUNY	FY 86 $156,189
New York, NY 10031	FY 87 $143,994
	FY 88 $148,065

"Establish a Center for Science and Mathematics Education"

The goal of this project is the improvement of science and mathematics teaching in the New York City area through the establishment of a Center for Science and Mathematics Education. The Center, established at City College, will coordinate the specific project activities aimed at accomplishing its goal. These activities include: 1) leadership training workshops for principals and science administrators in order to train, motivate, and support their teachers, 2) in-service science and mathematics courses for elementary and secondary teachers to increase their content background and enhance their pedagogical skills, and 3) conferences for educators on topics in science and mathematics education to provide participants up-to-date information on specialized topics and to provide practical support for their teaching efforts. A bimonthly Newsletter, funded by local sources, will be published to provide a teaching information exchange.

There will be two, two-day Leadership Training workshops held in the fall of each year, one for elementary principals and science administrators, and one for junior high principals and science administrators. Follow-up workshops will be held in the spring. Twelve courses will be offered in pairs, one course being content-oriented and the second emphasizing the educational applications of that content at the appropriate grade level. Two pairs of courses are offered for elementary teachers, one for either elementary or junior high, two for junior high, and one for high school teachers. The topics covered are physical science, computer programming and applications, and mathematics. One hundred and eighty teachers will be able to take advantage of these courses which will be offered during the academic year and during the summer. The conferences will be held in the fall and spring of each school year.

Alice Artzt	TPE-8550992
Queens College	$203,489
Flushing, NY 11367	Mathematics
	24 months

"Teaching Improvement through Mathematics Education (TIME)"

This project is designed to increase participants' knowledge of contemporary mathematics and techniques for teaching contemporary mathematics, and unify the secondary school mathematics program.

For each of the two years, 35 teachers of grades 9-12 will enroll in a 12-credit program that will be taught by a team of mathematicians and mathematics educators who will integrate the mathematics content and teaching methodology into the program.

Participants will be expected to implement TIME materials and ideas in their classes and to share project materials and ideas with their colleagues. Participants will be selected from the New York Metropolitan area.

A handbook will be produced that includes course outlines, course notes, approaches, techniques, bibliographies, and other materials suitable for use by college-school cooperative programs throughout the United States.

Emanuel P. Manche	CSI-8650282
Department of Chemistry	$23,268
CUNY-York College	Chemistry
New York, NY 10036	30 months

"Gas Chromatography-Mass Spectrometry in the Undergraduate Science Curriculum"

This project will interface a mass selective detector and data station with a donated gas chromatograph, so that undergraduate chemistry students at CUNY-York College can utilize the powerful modern analytical technique of gas chromatography/mass spectrometry (GC/MS). Students who major in chemistry or in other disciplines of science will use GC/MS in instrumental analysis, in an integrated physical-inorganic laboratory course, and in undergraduate research projects. The students will be introduced to gas chromatography and mass spectrometry first as stand-alone techniques, and later as powerful combination techniques for separating and identifying the components of complex mixtures. Particular laboratory projects will be chosen for their relevance to students' interests and major disciplines. Acquiring GC/MS capability will enable CUNY-York College to continue its significant contribution to chemistry education of minority students.

Al Hyslop
Children's Television Workshop
One Lincoln Plaza
New York NY 10023

MDR-8651543
FY 86 $19,808
6 months

"3-2-1 Contact 'Space Week'"

Children's Television Workshop(CTW) has produced a special 30 minute program for their "3-2-1 CONTACT" science series on the space program in response to the recent space shuttle tragedy. CTW has extensive footage on the scientific aspects of the space program along with interviews with astronauts Charles Bolden, Sally Ride, Mary Cleave and Franklin Chang-Diaz. The program is hosted by Robin, one of the regulars on "3-2-1 CONTACT."

This program, aimed at children ages 8-12, reviews the scientific aspects of space exploration, examines the risks, explores the many-faceted life of being an astronaut, and places the space program in an understandable context for children.

Bruce W. Selleck
Department of Physics & Astronomy
Colgate University
Hamilton, NY 13346

CSI-8650364
$45,000
Earth Sciences
30 months

"Improving Undergraduate Instruction through the Acquisition of a Scanning Electron Microscope and an Energy Dispersive Analysis Facility"

A series of experiments are being developed by the Geology Department at Colgate University to introduce undergraduates to modern analytical methods using the scanning electron microscope and the EDAX X-ray Analysis System. These experiments are being introduced into existing departmental courses with increasing levels of sophistication. The project also involves activities directed at larger audiences consisting of non-science students, faculty and secondary school students. In addition, the instrumentation is being used to enhance the existing program of cooperative student-faculty research, consistent with the departmental philosophy that problem-oriented research efforts are an essential part of undergraduate science education.

James N. Lloyd
Department of Physics/Astronomy
Colgate University
Hamilton, NY 13346

CSI-8651039
$27,749
Physics
30 months

"Ultra High Vacuum Techniques and Experimentation in Materials Science"

Ultra high vacuum (UHV) techniques are becoming standard for the study of materials and surface problems. This project will develop a high quality UHV facility so that Colgate can introduce training in these important techniques and experience with materials science problems into their upper level laboratory program. They intend to incorporate a carefully supervised training module into the experimental methods course, provide experimental exercises to support the Solid State Physics course, and use the system as a major station in the advanced laboratory program. In addition, there is a wide range of research problems in materials and surface science that are manageable for talented undergraduates to accomplish as independent projects. The basis for the project is a UHV system with a stainless steel test chamber that can be configured to accept a variety of experiments. Additional features to be incorporated are: (1) an ion sputter gun to get surfaces atomically clean, (2) a residual gas analyzer to support the training program in UHV techniques, and to do experiments in desorption of gasses from surfaces, (3) a means to prepare high quality thin films by evaporation, and (4) a reflection high energy electron diffraction system to investigate the structure of prepared films in situ, and make possible electron diffraction experiments.

Gilbert J. Lopez
Columbia University
Department of Engineering & Applied Science
510 Mudd Building
New York, NY 10027

MDR-8651523
FY 86 $372,476
FY 88 $160,494
FY 89 $166,773
24 months

"Model Project to Increase Mathematics Achievement at the Secondary School Level"

This project will test an instructional strategy designed to increase the pool of minority students who are successful in their study of algebra and higher mathematics courses.

Since 1979, the Comprehensive Math and Science Program at Columbia University has been developing an instructional model designed to give all entering ninth grade students the opportunity to work to their highest level of capacity in mathematics. Key features of the model are a zero-based start, which makes no assumptions on students' prior mathematics background, and a complementary curriculum, which provides a set of parallel, interlocking mathematics courses that substantially increases the rate of mathematics instruction over a four semester period. Preliminary tests of the model in New York City schools have yielded encouraging results.

In the current project, the instructional materials will be completed and the model will be extensively tested in New York City and in Fulton County, Georgia. The testing will be accompanied by the development of an apprenticeship model for teacher training, which will pair new teachers with experienced teachers in the interlocking courses of the program.

	MDR-8550295
Robert E. Cook	FY 86 $152,208
Cornell University	FY 87 $165,778
Ithaca, NY 14853	FY 88 $147,542

"LEAP - A Program of Informal Science Education"

Plantations, the botanical garden and arboretum of Cornell University, is developing a model program of informal education for elementary (K-5) school children. Project LEAP, Learning About Plants, will integrate the academic resources of Cornell University and the informal setting of its botanic gardens with the teaching of mathematics and science in local elementary schools.

The project contains five components: 1) a conceptually-based curriculum of biology, ecology and agriculture which will include some components of SCIS (Science Curriculum Improvement Study) and OBIS (Outdoor Biology Instructional Strategies); 2) a teacher training workshop to stimulate curriculum integration and modification; 3) multiple two-year visits between Plantations and local schools providing children with direct experience with plants and animals; 4) a quantitative program of curriculum development and evaluation based on learning theory; and 5) a plan for dissemination of the structure and instructional contents of this program. Because children will experience LEAP over a period of years, the complex and meaningful learning of concepts in science will be achieved in the earliest years of a child's education.

Because LEAP is being designed to become a model program applicable to many institutions of informal education, two publications will be produced: a notebook which describes the overall structure of the program, and a handbook for teachers which presents the individual lessons of the curriculum and the theoretical background supporting the choice of curriculum material. The notebook will distinguish those elements of the program peculiar to Cornell and Plantations, and mechanisms through which the program can be adapted to other institutions.

The project is being split-funded by the Instructional Materials Development and Informal Science Education Programs.

Carl F. Aten	CSI-8650349
Department of Chemistry	$22,193
Hobart & William Smith Colleges	Chemistry
Geneva, NY 14456	30 months

"High Performance Liquid Chromatography with Computer Data Acquisition in Upper-Level Chemistry Courses"

This project will add to the Chemistry Department instrumentation which will both enhance the current high performance liquid chromatography (HPLC) capabilities and give undergraduate students experience in the use of microcomputers to control instruments and acquire data. Recent advances in HPLC instrumentation and columns have resulted in powerful applications in all the subdisciplines of chemistry. As a result, this instrumentation has become an essential tool of research chemists in both industrial and academic settings. Furthermore, recent developments in microcomputer software have made modern instrumentation more powerful and subsequent data analysis more efficient. This project will introduce into the undergraduate curriculum at Hobart and William Smith Colleges a series of laboratory modules in upper-level chemistry and biochemistry courses that allow students to carry out increasingly sophisticated investigations utilizing the HPLC and computer capability. The students will use state-of-the-art separation technology for separation and analysis of complex mixtures. With the computer-enhanced display of both single and dual detector output, students will utilize the capabilities of computerized data acquisition to accomplish simultaneous separation, identification, and quantification of eluted compounds, and rapid comparison of chromatograms by simultaneous display. This modern instrumentation will be used by students in their coursework and in undergraduate research projects.

David Knee	TPE-8550088
Hofstra University	FY 86 $ 84,142
Hempstead, NY 11550	FY 87 $130,000
	FY 88 $ 48,000

"Teacher Training Institute at Hofstra"

This Leadership Activities project will provide enhancement and professional development experiences for 20 exemplary high school mathematics teachers from the Nassau County, New York area. The overall goals of the multiyear project involve the updating and deepening of the participants' mathematical backgrounds and teaching methodology, the networking of the participants, the conduct of in-service workshops by the participants in their home schools, the dissemination of the project materials and results to nearby school systems, and the investigation of the modelistic approach within a carefully planned documentation, assessment and evaluation effort. The second year of the project will involve 40 additional exemplary teachers.

Vicki L. Cameron	CSI-8650889
Department of Biology	$18,806
Ithaca College	Biology
Ithaca, NY 14850	30 months

"Development of a New Undergraduate Laboratory Course in Recombinant DNA Techniques"

With the funds conveyed in this award, the Biology faculty at Ithaca College will acquire a microprocessor-controlled ultracentrifuge and its rotors. A new, intensive, laboratory-oriented course in recombinant DNA methodologies is being developed for junior and senior biology and chemistry majors. The course is designed to illustrate many of the key concepts and methods of modern molecular biology.

One exciting aspect of the new course is that it will use recombinant DNA techniques on both procaryotic (bacteria) and eucaryotic (higher) organisms where future developments will have a profound impact on medicine, agriculture and numerous other areas. The course will provide students with the knowledge to understand and appreciate the latest advances in molecular biology.

Daniel A. Briotta, Jr.	CSI-8650938
Department of Physics	$10,645
Ithaca College	Physics
Ithaca, NY 14850	30 months

"A Spectrometer for Student Research Projects and Advanced Laboratories"

The physics department will purchase a SPEX optical spectrometer, detectors, and a light source to be used for advanced laboratories and student research projects. Physics students will use it to learn the principles of spectroscopy and to study atomic spectroscopy, solar and skylight spectra (i.e. Rayleigh scattering), wavelength dependence of absorption and emission, and optical properties of solids, and for their student research projects. Physics computing and engineering students will interface it to a microcomputer for control and data collection. This instrument will significantly broaden the research and advanced profits available to students.

Helen C. Hollein	CSI-8650428
Department of Chemical Engineering	$37,206
Manhattan College	Inter & Multidiscipl.
Riverdale, NY 10471	30 months

"A Fermentation Laboratory for Biochemical Engineering and Biotechnology"

The interdisciplinary biotechnology programs at Manhattan College and at the College of Mount Saint Vincent are being expanded and improved at both institutions by the addition of a required fermentation laboratory component for students majoring in chemical engineering and biology. This facility is housed at Manhattan College. Six experiments are being developed in bacterial fermentation, yeast production, continuous centrifugation, continuous cell disruption, precipitation and chromatography. The recent acquisition of a stirred-tank fermentor and an airlift fermentor is providing students with experience in state-of-the-art equipment in biotechnology. The Biotechnology Advisory Council, composed of members of the Biology, Chemistry and Chemical Engineering Departments from both institutions plus corporate consultants, assures that the goal of developing scientists and engineers with interdisciplinary expertise in biology, microbial genetics, biochemistry, biochemical engineering and computer science will be realized at both institutions.

Stephen Walsh	CSI-8651051
Department of Chemistry	$17,685
Manhattan College	Chemistry
Riverdale, NY 10471	30 months

"High Performance Liquid Chromatography in an Integrated Advanced Laboratory Curriculum"

A high performance liquid chromatography system will be used to teach principles of HPLC to undergraduate science and engineering students at Manhattan College and the College of Mount St. Vincent. The system will be used in four integrated, upper-division laboratory courses. In these courses, students develop skills and techniques in the analytical, instrumental, physical, synthetic, and biochemical areas. Experiments are sequenced so that basic skills are learned first, with a progression toward sophisticated, project-oriented work in the final course.

The project involves both the use of previously tested protocols and the development of new experiments. Their object will be teaching students the principles and applications of HPLC. Several specific chromatographic modes will be used: normal phase, reverse phase, ion exchange, and gel permeation. In addition, several types of detectors will be used: UV/visible variable wavelength absorbance, refractive index, fluorescence, and electrochemical. The curriculum is designed so that fundamental principles are learned in the early labs, while students in the later courses use the HPLC as an investigative tool for topics such as kinetics.

William T. Perrotte, Jr.	CSI-8650410
Department of Biology	$17,594
Marist College	Biology
Poughkeepsie, NY 12601	30 months

"Equipment to Support Integrated Undergraduate Lab and Field Experiences in Biological and Environmental Science"

The aim of this project is to strengthen the Biology curriculum at Marist College by developing a dimension presently lacking -- that of allowing seniors the opportunity to pursue scientific inquiry by engaging in an integrated field-laboratory research project. Since the College is located on the banks of the Hudson River, the Biology faculty has chosen to focus on studying the near-river and riverine communities of its ecosystem. To implement this project the college is using NSF grant funds and its matching monies to purchase binocular microscopes for the rapid scanning and accurate identification of organisms, a fluorescence microscope for identifying unknown viruses/bacteria using fluorescent-dyed antibodies which glow under the scope if they react with a specific virus/bacterium, and environmentally controlled growth chambers to allow for simulation in the laboratory of such field conditions as CO_2 level, light intensity, tidal movements, temperature, humidity and day length. This project allows the Marist Biology faculty to prepare students for realistic challenges they will meet in graduate schools and professional work.

Robert Madden
Department of Science
Marymount College
Tarrytown, NY 10591

CSI-8650949
$16,895
Biology
30 months

"Computer-Interfaced Physiological Equipment for Modernizing Undergraduate Neurobiology, Psychophysiology and Animal Behavior Laboratories"

The purpose of this project is to equip a modern psychophysiology lab with the computer-interfaced apparatus needed for it to support undergraduate instruction in three courses: Animal Physiology (biology), Animal Behavior (biology), and Physiological Psychology (psychology). Lack of suitable instrumentation previously limited coverage largely to lecture/discussion and reading--highly disadvantageous in any laboratory discipline. The project gives junior/senior-level students valuable exposure to modern biological instrumentation and automated data collection methods. The laboratory will also be used for an exercise in General Biology, demonstrations in General Psychology, and appropriate student research.

Mary Knopp
Department of Psychology
Mercy College
Dobbs Ferry, NY 10522

CSI-8650616
$30,113
Social Science
30 months

"Improving Courses in the Social Sciences with Microcomputers"

Through the acquisition of microcomputers and related software, the research design and analysis courses offered by the Departments of Psychology, Sociology and Behavioral Sciences have been improved by providing students "hands on" experiences and "real life" application of theory. Students' experience in designing their own programs and experiments have also been enhanced.

Alan Friedman
New York Hall of Science
47-01 111th Street
Corona, NY 11368

MDR-8550953
FY 86 $144,846
FY 87 $118,737
FY 88 $ 12,467

"Improving the Effectiveness of Science-Technology Center Exhibits"

The New York Hall of Science will develop a major exhibition on quantum theory--one of the most important developments in physical science in this century and one which has not been significantly treated by science museums. This exhibition will be the first major museum program to introduce quantum theory and its applications to the public.

Elements of the exhibit will include models of the atom, the puzzle of light, applications of the theory and, finally, the human story of the creation of a new theory. Numerous participatory exhibits will be developed in conjunction with the project so that visitors can learn by doing.

Formative evaluation will be an integral part of this exhibit. This technique has recently been adopted by museums as a way to test exhibit prototypes with museum visitors and then redesign as necessary. A workshop will be held for museum personnel and a guidebook, Improving Exhibits Through Formative Evaluation, will be produced. This book will be the first complete description of the formative evaluation process and will be a valuable addition to the museum field.

Peggy R. Cole
New York Hall of Science
Flushing, NY 11352

TPE-8651471
$130,566
24 months

"Developing School Visits Through Museum-School Collaboration"

The major goals of the project are to: 1) improve the effectiveness of school visits to museums, and 2) improve the quality of instruction in schools by integrating the school visit to museums with the science curriculum.

The project provides a model which changes the structure of museum departments. Classroom teachers will be included to assist with school visits to the museum, the development of pre/post materials, workshops in the museum, and on-floor museum interpretation. The project targets grades 4-6, and will use the existing mandated science curriculum in preparing content selection for school visit activities.

The New York Hall of Science will assemble three teams of five "Distinguished Teachers" each who will work with museum staff over a two-year period to develop all aspects of the school visit. Museum and school staff will then evaluate and refine the materials. Participants will train their peers in the use of the museum as a curriculum resource.

The involvement of teachers in the development of school visits to museums should greatly enhance the value of such visits. This type of collaborative effort can serve as a model for other museums.

Stephen S. Willoughby
Kenneth Goldberg
Sharon L. Weinberg
New York University
Department of Mathematics, Science
& Statics
New York, NY 10003

MDR-8651629
FY 86 $356,442
FY 88 $282,487
FY 89 $154,720
24 months

"K-6 Supplementary Mathematics Materials for a Technological Society"

Perhaps the most important changes that ought to be made in traditional mathematics textbooks in order to prepare learners for a technological world have to do with the way mathematical concepts are taught in the first place, how they are practiced, and the kinds of applications that are presented. Many of these changes are not dependent on the use of calculators and computers, and some are currently finding their way into commercial textbooks. Others, which depend on activities in which calculators and computers play an important role, are slower to appear significantly in commercial texts because of the unlikely commercial success of a text series that requires access to calculators and computers throughout. This project will focus on materials that model changes of the latter type.

The project will develop supplementary mathematics materials for grades K-6 that will assume universal access to calculators and easy access to computers in the classroom. The materials will encourage problem solving, mathematical thinking, and intelligent use of technology. The final product will be a series of pamphlets (teacher materials and student materials) that can be used with any existing K-6 mathematics textbooks. A bibliography of appropriate calculator and computer books, software, and other materials will be provided in the pamphlets and referred to where appropriate.

Arthur S. Melmed	MDR-8652287
Robert A. Burnham	$54,853
SEHNAP	7 months
New York University	
70 Washington Square South	
New York, NY 10012	

"Strategic Planning for Pilot Demonstration of the Use of Advanced Information Technology to Improve American Education"

Based on accumulating evidence of instructional effectiveness from research in small individual studies and the clear potential of new technological developments, many national boards and commissions have recently recommended exploring the use of technology to improve American education. This proposal aims to assist state and federal agencies concerned with educational improvements to evaluate the potential of technology to influence directly the solution of problems of American education, using large scale demonstration in typical educational settings. A planning framework will be developed to assist in the selection of suitable demonstrations. Some model demonstrations that meet the criteria of the planning framework will be roughed out. These rough designs will be reviewed by educational policy makers, experts, and industry and foundation officials at an invited conference.

This activity aims at identifying applications of technology that can make a prima facie difference in American education. A report of the conference will include a discussion of the planning framework, and a description and critique of the model demonstrations.

Annette Berkovits	TPE-8650177
New York Zoological Society	$67,173
New York, NY 10001	Zoology
	16 months

"Training Middle Grade and Secondary Science Teachers in the Use of Zoological Collections for Science Instruction"

This Leadership Activities project will provide preparation for 30 middle/junior high school teachers and for up to 60 school administrators in the use of zoological collections in science education. Instruction will be conducted at the Bronx Zoo by education staff from the zoo, collaborating with experienced teachers and science administrators. Curriculum materials during the workshop will include the Wildlife Inquiry through Zoo Education (Project WIZE) developed with National Science Foundation funding. This award-winning curriculum was designed to link classroom study with zoo field work. The project will include experiences with JungleLab, a classroom/laboratory overlooking lush tropical settings in JungleWorld, which is a massive indoor exhibition of Asian habitats. JungleLab provides unique opportunities to observe wildlife in a setting much like that experienced by research biologists in the field.

Participants will be selected based upon their leadership skills in teaching, their experiences in biology, and the willingness of their school districts to support project activities. We anticipate that following the workshop each of the leadership teachers will conduct appropriate field activities at zoos in their home communities and also conduct outreach activities in workshops for teachers in their home school districts.

Francis T. Marchese
Department of Computer Science
Pace University
New York, NY 10038

CSI-8651027
$22,990
Computer Science
30 months

"Advanced Computer Graphics and Computer Vision Laboratory"

The effects of computer graphics and computer vision on our society are increasingly pervasive. Courses in these fields provide a well established framework for the assimilation of previously learned concepts from mathematics, physics and computer science, and the rigorous development of robust problem solving skills. Pace University will purchase four Sun 3/160S graphics terminals for use on an existing 3/160 system. These will allow the teaching of state-of-the-art graphics and vision techniques. Exposure to this state-of-the-art computational environment will produce more intellectually sophisticated and technically equipped computer scientists.

David E. Roll
Department of Biology
Roberts Wesleyan College
Rochester, NY 14624

CSI-8651086
$6,270
Biology
30 months

"Equipment to Modernize Undergraduate Laboratories for Molecular Biology and Biochemistry"

Equipment purchased through this award is being used to enable students to investigate principles of molecular biology through the development of laboratory experiments and independent research projects. Specific objectives are to include the basic theoretical principles of molecular genetics, gene fusions and molecular biochemistry in the Department's Genetics course and also in Biochemistry -- a course offered jointly by the Biology and Chemistry departments. The need is to provide a "hands-on" laboratory experience in these courses in order to directly illustrate important theoretical principles, while greatly expanding opportunities for students who enroll in the undergraduate research program. The project will enable Roberts Wesleyan students for the first time to participate in the development of reproducible experiments in molecular biology. One feature of the effort is the introduction it provides advanced majors to the rapidly expanding field of recombinant DNA technology.

John L. Ellis
Department of Science & Technology
Rochester Institute of Technology
Rochester, NY 14623

CSI-8650721
$50,000
Engineering
30 months

"An Undergraduate Laboratory for Digital Systems and VLSI"

This project will provide undergraduate students in computer science, computer engineering, microelectronic engineering, and electrical engineering the opportunity to design, implement, and test significant digital systems. It will provide the necessary equipment for a new computer architecture laboratory. This laboratory will be used primarily by students in two new undergraduate concentrations: the 3-course digital systems design concentration in computer science and the 2-course very large scale integration (VLSI) design sequence in computer engineering. It will be used by microelectronic engineering students to provide functional testing of integrated circuits (IC's) fabricated at RIT.

Three new computer aided design (CAD) workstations will provide schematic capture and simulation at the functional, logic, switch, and circuit level. They will also include capabilities for board placement, routing, and layout, as well as integrated circuit layout. A fourth workstation will be used for testing boards and IC's. It includes 32 bits each of pattern generation and state analysis. Additional equipment includes oscilloscopes and 2 multibus computer systems. The multibus systems will provide the computer interface for boards designed by students. The oscilloscopes will be used to analyze and debug boards and other circuits.

The project will produce computer science students with greatly increased competence in hardware and embedded systems. It will result in computer engineering students who have considerable experience in the design of complete systems involving VLSI components. It will also provide new undergraduate research opportunities for seniors in both disciplines.

Ronald C. Dilcher
College at Brockport
Brockport, NY 14420

TPE-8651532
$105,918
Environmental
30 months

"Environmental Impacts Analysis Techniques for Secondary Schools"

This project will deliver in-service training to 30 junior and senior high school teachers. The project hypothesizes the creation of an environmental center in an environmentally-sensitve wetland along Lake Ontario. The data gleaned from the project will aid in planning programs for a proposed new environmental center.

Participants will attend a five-week summer course beginning in July of 1987. During this segment of the program, participants will learn how to evaluate the environmental consequences of the development. Subsequently, a series of five monthly curricular workshops during the following academic year will use the summer experience to create suitable curricular modules for the participating schools. The cycle of a summer course and five curricular workshops will be repeated the following year with a new and different group of teachers. During the summer institute, each school will be asked to recommend student "colleagues" to work with teacher in field collection and identification projects.

Bonnie B. Barr
SUNY College at Cortland
Cortland, NY 13045

TPE-8552394
$59,420
12 months

"A Development Program for K-3 Teachers in Multidisciplinary Science and Inquiry Skills"

The State University College at Cortland is offering a three-component program to improve science education in grades K-3 in school districts within a 60-mile radius of the University. The program includes one-day science Exploratoriums for educators and the public to focus on the needs and possible solutions for improved science education, an intensive two-week Summer Institute for four-member teams consisting of K-3 teachers and an administrator from 10 regional participating school districts, and an implementation project which will promote and support quality science instruction in the District's primary grades.

The 84 participants will be involved through hands-on inquiry experiences with multidisciplinary science concepts, methodologies which encourage basic skills through science instruction, activities which encourage participation of girls and minorities in science, and the innovative use of technology to enhance K-3 instruction. Experienced peer teachers will be involved in the instruction as well as in the follow-up on-site visits. An interesting part of the project involves the training of parents and intermediate-age school children as lab aides to further assist the classroom teacher in conducting a good experiential program for the primary grade children.

James A. Boiani	CSI-8650452
Department of Chemistry	$19,570
SUNY College at Geneseo	Chemistry
Geneseo, NY 14454	30 months

"Incorporation of Laser Experiments and Techniques into the Undergraduate Chemistry Curriculum"

The objective of this project is to acquaint undergraduate chemistry students with the operation and application of lasers in physical and analytical chemistry. Because of their unique properties, lasers have taken a major role in the instrumentation used for chemical research. Therefore, it is important that potential chemists become familiar with this component so that they will be better prepared to begin their professional careers. An easy-to-use, cost-effective tunable dye laser system with a signal measurement system will be used in an advanced laboratory course and in student research as the basis of a number of experiments designed to highlight the versatility of this light source. The availability of the laser will expand the usefulness of several other instruments already in the department. The experiments done with the laser system will be published in the appropriate areas in order to encourage more extensive use of this instrument at undergraduate institutions, and to help meet a national need for published experiments with lasers. The final result will be better education in the field of chemical instrumentation.

William J. Pietraface	CSI-8650304
Department of Biology	$18,587
SUNY College at Oneonta	Biology
Albany, NY 12201	30 months

"Laboratory Equipment to Support a New Undergraduate Course in Biotechnology"

The areas of plant and animal biotechnology utilize living organisms or their components in both basic and applied research and also in industrial processes. In response to the vast potential offered by this field, the Biology Department at the State University of New York-College at Oneonta has developed a Biotechnology Study Option for undergraduates. The key course in this study option is a one-semester interdisciplinary course entitled Biotechnology. This course provides students with an introduction to the basic techniques of biotechnology and the theory behind them. In order to accomplish this, a plant cell biologist, a microbiologist, a geneticist, and a biochemist team-teach the course, providing the necessary background to students' lectures, laboratories, and demonstrations. The NSF award enables this department to purchase two major instruments needed to launch the program -- a cell fusion system and a tabletop ultracentrifuge.

Carl M. Horner	CSI-8650339
Department of Chemistry	$13,691
SUNY-College at Oneonta	Chemistry
Albany, NY 12201	30 months

"A Fourier Transform Infrared Spectroscopy System for Undergraduate Chemistry"

This project will introduce Fourier transform infrared spectroscopy (FT-IR) into undergraduate laboratory instruction and undergraduate research projects at SUNY-College at Oneonta. The laboratory experience with FT-IR in instrumental analysis laboratories will complement the lecture material on Fourier transform techniques. These powerful techniques are used increasingly in industrial and other research laboratories to solve difficult problems in chemistry. Thus chemistry education at the college will be upgraded substantially, and chemistry graduates will be better prepared to enter the scientific workforce or to begin graduate studies.

Joseph W. LeFevre	CSI-8650527
Department of Chemistry	$12,940
SUNY-College at Oswego	Chemistry
Albany, NY 12201	30 months

"Liquid Scintillation Counting in the Undergraduate Chemistry Curriculum"

This project will improve undergraduate laboratory courses in advanced organic chemistry and instrumental analysis, and will enhance the ongoing undergraduate research program of SUNY-College at Oswego, by introducing liquid scintillation counting (LSC) into the chemistry curriculum. A liquid scintillation counter, a device used to measure low levels of radioactivity, will be used by students for a variety of applications involving radioactive tracers. These investigations include studies of chemical reaction pathways, analyses of mixtures, and elucidation of biochemical pathways. As an analytical technique LSC is simple and safe, yet extremely powerful, and highly efficient for detecting low-energy beta radiation. Providing students with experience in LSC is especially valuable because of the extensive role LSC plays today in industry and in chemical and biological research.

David A. Bozak	CSI-8650873
Department of Psychology	$15,500
State Univ. of New York-Oswego	Psychology
Oswego, NY 13126	30 months

"Integration of Graphics and Software Tools into an Experimental Psychology Curriculum for Undergraduates"

This project will develop and install an experimental computer-based Psychology curriculum designed to increase the depth of understanding of psychological and statistical concepts through computer-based graphic demonstrations, simulations, tutorials, and the mathematical modelling of psychological phenomena. Preliminary progress has been achieved on a relatively small scale by individual faculty who, over the years, have been writing educational software for the use of their own students. Now the Department feels it is time to make a coordinated effort to tap this resource by expanding the use of this currently available educational software and by encouraging the development of new software. The primary limitation to implementing such a program in the past has been the lack of available hardward. The courses where this program will have a major impact are the Analysis of Psychological Data, Research Methods in Psychology, Experimental Psychology, Topics in General Psychology, and Advanced Research Methods, plus the Independent Study and Honors Research Programs.

This computer-based curriculum is expected to make possible dimensions of academic pursuit that would be unattainable without the thorough integration of the computer into the day-to-day coverage of course material.

Roy S. Malpass
Department of Behavioral Science
SUNY College-Plattsburgh
Plattsburgh, NY 12901

CSI-8650963
$23,375
Social Science
30 months

"An Interdisciplinary Research Instruction Program in the Behavioral Sciences"

The Behavioral Science Program at SUNY-College at Plattsburgh has developed a research instruction program whose goal is to make participation in research accessible to a larger number of students. Computer systems acquired through this project will support research instruction in five behavioral science research areas, with researchers in anthropology and psychology initially involved in conducting research seminars. Computerized images of artifacts as an aid in analysis and instruction, research in facial recognition and eyewitness identification through construction, editing, combining and displaying computerized images, and experiments in human memory and social judgment in real or simulated group settings are among the activities to be carried out. The results of student research projects will be published and presented at professional meetings.

William J. Doody
SUNY College at Potsdam
Potsdam, NY 13676

TPE-8652068
FY 86 $167,649
FY 87 $176,333
FY 88 $175,954
FY 89 $171,059
FY 90 $159,467

"NSF Middle School Math and Science Education Program at Potsdam College"

Potsdam College, a regional state teacher preparation institution, proposes to develop a model program to prepare middle school teachers in both science and mathematics. The program will consist of 36 semester hours in science, 21 in mathematics, and 24 in professional education with a two-semester teaching internship. The programs goals are to provide teachers with breadth and depth of understanding of science and mathematics; an understanding of the interrelationships among scientific and mathematical disciplines; and an appreciation of the relevance of science and mathematics to society and to the lives and concerns of middle school students. Teams of scientists, mathematicians, educators and master middle school teachers will design the new curriculum. The science courses, progressing in sophistication and conceptual depth, will integrate the fundamental concepts of biology, physics, chemistry and geology. Students leaving the program after two years will receive credit for the introductory year in each science area. The mathematics minor, coordinated with the science major, consists of four modified courses and three new ones. The new courses will focus on applying mathematics and the integration of topics from the previous courses. The computer will be part of all courses; PASCAL will be introduced in the last mathematics course. The existing professional education courses will be adapted to the needs of middle school teachers and the two methods courses will be co-taught by college faculty and a master middle school teacher. During the professional or final year of the program, students will teach two classes during the first semester in classrooms of the master teachers and carry a full teaching load the second semester. The program will be carefully evaluated and its effectiveness widely shared.

Douglas E. Hatch	CSI-8650775
Department of Computer Science	$31,538
Siena College	Computer Science
Loudonville, NY 12211	30 months

"A Laboratory Computer for Upper-Level Computer Science"

The Computer Science Department at Siena will purchase a microVAX II computer, 456 Megabyte disk, Ethernet interface, eight terminals, and ULTRIX software in order to provide a dedicated laboratory computer for upper-level majors. The microVAX will be networked to an existing VAX-11/780 for access to other printers, disks, and additional software. The microVAX will be used in several areas. In the Operating Systems course it will give the students a chance to explore the adjustment of operating system parameters and run benchmark programs. In a new Systems Programming course it will allow direct access to and modification of the operating system. Finally, it will be used for student independent study projects and simulations. The computer will greatly enhance the opportunity for the study of advanced topics in computer science.

Elaine C. Rubenstein	CSI-8650404
Department of Biology	$20,100
Skidmore College	Biology
Saratoga Springs, NY 12866	30 months

"Ultracentrifugation for the Study of Subcellular Organelles and Macromolecules"

The methods of cell fractionation and macromolecule purification and the subsequent detailed analysis which they make possible are essential for future biologists to comprehend and practice. The acquisition of an ultracentrifuge and two rotors significantly enhances the ability of Skidmore's Department of Biology to teach these key concepts in cell and molecular biology. The ultracentrifuge makes possible a series of laboratory experiments to purify organelles (e.g. golgi, microsomes) or macromolecules (DNA, RNA, proteins) for further characterization by biochemical and structural methods -- experiments that were not possible without the instruments secured through this grant. The new equipment considerably expands and updates the laboratory experience of the students, improving their understanding of cell structure and function, the molecular basis of cell function, and current research techniques. Courses from the sophomore to senior level are being affected.

Mary A. Foley
Department of Psychology
Skidmore College
Saratoga Springs, NY 12866

CSI-8650717
$8,291
Psychology
30 months

"A Computer-Based Undergraduate Psychology Laboratory"

Six microcomputers equipped as laboratory controlling devices for a new student laboratory facility in the Psychology Department are enhancing and facilitating Skidmore College's instructional capabilities in at least three ways. First, the kind of lab projects and simulations previously possible to conduct in the experimental psychology lab were limited to those that minimized the use of peripheral devices and that lasted for 20 minutes or less. Students received a somewhat distorted view of the kinds of questions psychologists address, and, as a consequence, a distorted view of the range of theoretical issues of concern to psychologists.

This new lab facility, therefore, is important for the enrichment of this experimental laboratory course and other advanced courses (e.g., perception, cognition) as well. Over the past 5 years an increasing number of students have engaged in independent research and senior theses. This facility contributes in important ways to the development of their research efforts. Finally, a large number of students will be able to participate in laboratory simulations directly, rather than by indirectly observing another person conduct the simulations.

A modest amount of computing equipment with its attendant instrumental interfacing will have a large impact upon the quality of laboratory work available to upper division students in numerous classes and in independent study.

Sharon L. Senk
Department of Mathematics
200 Carnegie Building
Syracuse University
Syracuse, NY 13244-1150

MDR-8550211
FY 86 $61,096
18 months

"A Conference on the Van Hiele Model of Geometric Thought"

In 1957 in the Netherlands, Pierre Marie Van Hiele and his wife Dina Van Hiele - Geldof postulated a model of the development of geometric thought. The model, which posits the existence of discrete levels of geometric thinking and phases of instruction that help students progress through the levels, explains why many students have difficulty learning geometry. Since 1979 three major research studies have investigated the validity of the Van Hiele model and its applicability to American Schools.

The project will convene 30 people (the principal investigators and senior personnel from previous Van Hiele - based research, scholars from mathematics education, psychology and computer science, local supervisors, and teacher trainers) for a two and one half day conference at Syracuse University. The objectives of the conference are (1) to analyze, synthesize, and evaluate recent research on the Van Hiele model; (2) to examine alternative models of geometric thinking; (3) to plan ways to utilize current research results in developing materials for students and teachers of geometry; and (4) to outline directions for future research.

Conference proceedings will be disseminated via a book of scholarly papers edited by the conference organizer, via journal articles and other professional publications, and via workshops and lectures by conference participants at professional meetings.

Herbert P. Ginsburg
Teachers College
New York, NY 10027

TPE-8642840
$20,305
Mathematics

"Children's Mathematical Thinking: Video Workshops for Educators"

This project is developing and evaluating, for national distribution, a workshop "package" which includes videotaped interviews with children, materials for training workshop leaders, and exercises for workshop participants. The workshop focuses on the analysis, diagnosis, and remediation of children's mathematical thinking. Through a supplemental Research Opportunity Award, Dr. Susan Zelman of Emmanuel College (Boston) will join the project to take responsibility for the "learning demonstration" materials which are to be part of the workshop exercises. Most of Dr. Zelman's work will be conducted in Boston. She will, however, be in resident at Techers College during the next three summers and travel occasionally to New York to meet with the project staff.

Ronald E. Yasbin
School of Medicine
University of Rochester
Rochester, NY 14627

TPE-8642598
$107,588
Biotechnology
12 months

"Biotechnology in Secondary Education"

During the first year of this project the staff focused on developing six intensive one-week courses in biotechnology and four slide-tape presentations depicting laboratory techniques in recombinant DNA technology and molecular biology for secondary science teachers.

The current project will continue the development of instructional materials (four additional slide-tape presentations) emphasizing biotechnology laboratory procedures and related theory. During Fall 1986, classroom testing of prototype presentations will begin with an overall evaluation of the program planned for Summer 1987. Final versions of the slide-tape presentations will be available to science educators for reproduction costs at the completion of the project.

NORTH CAROLINA

Presidential Awards for Excellence in Science and Mathematics Teaching

Valeria Alston
Science
Vance Senior High School
Henderson, NC 27536

John A. Goebel
Mathematics
North Carolina School of
Science and Mathematics
Durham, NC 27705

Fellowships

Duke University Durham, NC 27706 Graduate Research Fellowships Support Grants	$216,350
North Carolina State University at Raleigh Raleigh, NC 276958 Graduate Research Fellowships Support Grants	$78,230
University of North Carolina at Chapel Hill Chapel Hill, NC 27514 Graduate Research Fellowships Support Grants	$186,450
University of North Carolina at Greensboro Greensboro, NC 27412 Graduate Research Fellowships Support Grants	$16,350
University of North Carolina at Wilmington Wilmington, NC 28403 Graduate Research Fellowships Support Grants	$16,350

H. William Paul
Harriet Cornwell
Appalachian State University
Boone, NC 28608

TPE-8651498
$132,242
Mathematics
48 months

"Northwest Region Mathematics Teaching Enhancement Program"

This project is designed to enhance the capabilities of mathematics teachers from the rural Northwest Educational Region of North Carolina. Sixty teachers in grades 9-12 will be served through five courses, two offered each of three summers. These courses are aimed at helping teachers work with mathematical concepts, materials, and methods that begin with what they now know and teach. The courses will cover problems in remedial mathematics, computing, problem solving, discrete mathematics, and concepts of calculus. In addition to the summer course work, there will be a one-day follow-up workshop in the fall for summer participants and a follow-up visit by the faculty to each participant's classroom in the spring. The project is specifically designed to strengthen the backgrounds of mathematics teachers from this geographic area who are particularly weak and insecure in their content preparation and teaching. The project aims to attract these teachers to the program through videotaped publicity about the courses broadcast throughout the region. The project seeks to improve not only the teachers' content preparation but also their self-esteem and appreciation for teaching. Project evaluation will focus both on changes in content presentation and in teachers' attitudes.

Elizabeth M. Baker
Belmont Abbey College
Belmont, NC 28012

TPE-8552383
$191,319
36 months

"Science Explorations for Junior High School Science Teachers"

This project will improve both the knowledge of science and the techniques of teaching science of junior high school teachers. Twenty-four participants will be selected from the Gaston County area of North Carolina.

The objective will be to provide a background in both theory and the laboratory which can be readily and directly incoporated into the classroom.

The format for this project will be a four-week period of course work during the summer to be followed by a series of nine, late afternoon workshops during the regular school year. The summer work will combine both lecture and laboratory work and will lay necessary groundwork for the continuing series of workshops. At the end of each year a participant will be selected to become a part of the teaching faculty for the following year.

Wolfgang Christian
Department of Physics
Davidson College
Davidson, NC 28036

CSI-8650382
$28,614
Physics
30 months

"Microcomputer Assisted Physics Laboratory Experiments"

The Physics Department will purchase 8 IBM PC's, 3 AT's, analog and digital input and output boards, and the hardware for a network. The computers will provide the facilities for data collection and analysis in introductory and advanced laboratories. They will provide students a way of obtaining larger quantities of data than can conveniently be obtained by hand, and they can collect data on rapidly changing phenomena. In addition, the computers will allow improved data analysis and graphical presentation.

Chia-yu Li
Department of Chemistry
East Carolina University
Greenville, NC 27834

CSI-8650289
$10,609
Chemistry
30 months

"An Integrated Electrochemical/Computer System in Quantitative and Instrumental Analysis Laboratories"

This project will upgrade the electrochemical instrumentation and computer facilities in two undergraduate analytical chemistry courses: "Quantitative and Instrumental Analysis" and "Instrumental Analysis." The first is a sophomore/junior-level course required for chemistry, biochemistry, and medical technology majors. The second is a senior level course required for chemistry majors.

A microprocessor-based electrochemical instrument will replace antiquated analog equipment. This commercially available system is constructed around a cybernetic potentiostat and has control software for a variety of electrochemical techniques. An external personal computer is interfaced with this instrument as a data station for mass storage and data manipulation. This system enables students to perform modern electrochemical experiments and to learn the techniques of digital data acquisition and computerized data analysis encountered in today's academic and industrial laboratories.

Franklin G. King
Department of Chemical Engineering
North Carolina A&T State University
Greensboro, NC 27411

CSI-8650813
$32,000
Engineering
30 months

"Enhanced Instruction in Chemical Process Dynamics and Control"

With the recent acquisition of a process control trainer, the Department of Chemical Engineering at North Carolina A&T University is adding completely instrumented laboratory experiments to its process control laboratory. The trainer provides for the control of flow rate, level, temperature and pressure, and interfacing to an IBM-PC provides computer control capability. Advanced control strategies such as cascade control, feedforward control, flow ratio control and dead time compensation can be studied.

All juniors will study computer control as part of their required laboratory experience in process control. In addition, seniors will be able to develop and test control strategies on the trainer as part of the required Plant Design course and the elective Independent Study course. The enhanced education will provide chemical engineers with better preparation for work in industry.

Thomas Krakauer
North Carolina Museum of Life and Science
P.O. Box 15190
Durham, NC 27704

MDR-8651995
FY 86 $ 42,250
FY 87 $ 62,939
FY 88 $182,700

"The Science Behind Medicine: The Shape of Things to Come"

This project at the North Carolina Museum of Life and Science, Durham, North Carolina, will create a 2000 square foot permanent exhibition, "The Science Behind Medicine", using recent advances in medical science and technology to illustrate basic science concepts. It will engage visitors through their strong interest in health and medicine, present valuable information about medical subjects, and use their interest to present underlying scientific concepts they would otherwise avoid.

The exhibition will be organized around four topics: organ structure and function and organ replacement and transplantation; advances in medical imaging, including infrared, ultrasound and x-ray technologies; pharmaceutical pharmacology, biological receptors and molecular design; and sickle cell anemia and its molecular biology. Over five years, more than one million people will use the exhibit, including both highly educated residents of the Research Triangle area, and a Durham population that is disadvantaged and 50% black.

Extensive subject area consultation and formative evaluation will be used in exhibition design. A close consulting relationship is planned with two museums with similar exhibit interests, and exhibit research and plans will be offered to other interested museums to encourage wider use of the project's results.

A strong regional health sciences focus will benefit the project through academic, business, community and industry membership on a project planning committee, and from 50% local matching funding. Two corporate planning grants have been awarded to the project, and a major facilities expansion funded in part by a recent bond issue.

John S. Risley	MDR-8652040
North Carolina State University at Raleigh	FY 86 $39,082
Department of Physics	24 months
Raleigh, NC 27695-8202	

"Comprehensive Evaluation and Review of Precollege Physics Educational Courseware"

The objective of this project is to provide for secondary teachers timely reviews of commercially available courseware in physics and physics-related topics which is available for use with the most popular microcomputers currently in classrooms throughout the nation. Experienced professional reviewers along with independent field testing in schools will provide in-depth evaluation and comparative analysis.

Results of the evaluations will be published in The Physics Teacher. Modified reviews and detailed comparative articles will be submitted to The Science Teacher and to other magazines and journals specializing in science education and/or microcomputers. A yearly directory of physics-related courseware will be prepared for publication by a commercial publisher. Papers and workshops will be given at national meetings on the use and effectiveness of the courseware.

Requests from teachers across the country for information have far exceeded original predictions and additional staff are required. This award, which supplements Grant No. MDR-8470450, will enable the project director to meet this unexpected demand.

Vernon R. Thompson	TPE-8651738
Robeson County Schools	$89,692
Lumberton, NC 28359	12 months

"Implementing Robotics Education in the Classroom"

This project is a continuation of a successful program previously funded for junior high and high school science and/or mathematics teachers. Thirty-two teachers will be given the opportunity to develop proficiency in robotics labs, utilizing these labs and concepts as a classroom resource. This will be accomplished by holding sessions once a week during the spring semester and a week-long session in June.

Classroom visitations for purposes of support and observation will be conducted throughout the spring and again the following fall. The outcomes will include heightening the teachers' capabilities in articulating "Hi-tech" careers for the students in this newly emerging area of technology. This hands-on, experiential project aims to motivate and excite the teachers and students to the many possibilities of technology in their lives. The intention is to integrate the robotic technology into the existing science and/or mathematics curricula.

Donald Steila	TPE-8550885
University of North Carolina	$100,000
Charlotte, NC 28223	Earth
	24 months

"A Training Program for Teachers-Learning of Materials Development Skills in the Earth Sciences"

This project will provide an opportunity for 30 middle school teachers to improve their research, materials-development, and problem-solving skills in the area of earth science. Each teacher will participate in an intensive 3-week, field-oriented academic experience in the summer during which time he or she will be a part of a research team attempting to solve environmentally-related problems. Under the supervision of a university professor and a Master Teacher, teams will collect, analyze and present field materials that include rocks, fossils, soils, water, atmospheric and photographic data. Four weekends during the academic year will also be devoted to formal program activities.

This project focuses attention on science as a problem-solving activity. Each participant, through involvement in research projects, will acquire meaningful problem-solving skills. Much attention will be given to means of using both the materials acquired and developed and problem-solving skills in the middle school classroom. Throughout the academic year, teachers will be required to present evidence that they are integrating their recently acquired knowledge and skills into their classroom activities.

Paula Goolkasian
Department of Psychology
University of North Carolina-Charlotte
Charlotte, NC 28223

CSI-8650194
$42,412
Psychology
30 months

"Creation of a Computer-Based Laboratory for General Psychology"

This project will upgrade the General Psychology Laboratory by phasing out the use of animals and replacing obsolete equipment with a computer-based laboratory. Thirty-six Apple IIe computers and a Corvus Omninet will be used to develop an instructional lab to teach 500 students each semester.

The purpose of the lab is to provide hands-on experience with contemporary research projects in psychology. Psychology majors will be exposed to research projects from a variety of areas in psychology and will acquire laboratory skills necessary for more advanced courses. Freshmen who use General Psychology to fulfill their university science requirement will become acquainted with research projects using up-to-date methodology and thus obtain a much more adequate introduction to science and scientific methodologies.

Sybil K. Miller
Department of Chemistry
University of North Carolina-Wilmington
Wilmington, NC 28403

CSI-8651049
$25,748
Chemistry
30 months

"Development of an Advanced Laboratory Course in Biochemical Techniques and Instrumentation"

This project will result in the development of an undergraduate biochemistry laboratory course that emphasizes modern techniques and instrumentation. The laboratory course will complement the ongoing biochemistry lecture course, and will enhance substantially the biochemistry education of students at the University of North Carolina at Wilmington. This project will provide a suite of instruments (including an automatic recording titration system, a liquid chromatography system, a densitometer, a preparative ultracentrifuge, and an electrophoresis unit) to be used primarily in the new biochemistry laboratory course and also in physical and analytical chemistry courses. Students will gain experience with buffer and other reagent preparation, protein assays, protein purification, protein and DNA electrophoresis, enzyme kinetics, tryptic peptide digestion, membrane vesicle construction, DNA isolation, and radioisotope labelling. The experimental work will illustrate important concepts in biochemistry, and will help students attain proficiency in widely used biochemical techniques.

Stanford Hill	TPE-8550494
Winston-Salem/Forsyth County Board of Education	$62,348
Winston-Salem, NC 27102	24 months

"Improvement of Elementary Mathematics and Science Instruction Through Peer Training"

The Winston-Salem/Forsyth County Board of Education, in collaboration with the State Education Agency and the Winston-Salem Foundation, has set up a four-phase program for the training of all elementary school teachers. The first two phases of this long-range program have been accomplished.

Phase 1 of the project involved one teacher in each of the 36 elementary schools in the county who attended a summer institute, and then shared ideas and expertise with colleagues during the school year. Phase 2 featured the training of teams in four specific disciplines, physical science, biological science, earth-space science, and mathematical problem solving. Phase 3 will provide for an increase in the number of team training sessions and a 10-day institute for formative training for the teaching team. Peer training will be carried out in each of the elementary schools by these teaching teams. Phase 4 will be devoted to dissemination and replication throughout Region V. Evaluation of this project will allow for continuous assessment and feedback which will enable potential problems to be corrected before the program is fully operational.

NORTH DAKOTA

Presidential Awards for Excellence in Science and Mathematics Teaching

David McCormack
Mathematics
Minot High School Magic City Camp
Minot, ND 58701

Stephen F. Seymour
Science
Gackle Public School
Gackle, ND 58442

OHIO

Presidential Awards for Excellence in Science and Mathematics Teaching

Margaret Raub
Mathematics
Strongsville High School
Strongsville, OH 44136

Spencer Reames
Science
Benjamin Logan High School
Zanesfield, OH 43360

Fellowships

Case Western Reserve University Cleveland, OH 44106 Graduate Research Fellowships Support Grants	$26,100
Individual Award for Foreign Tenure Graduate Research Fellowship	$17,100
Kent State University Kent, OH 44242 Graduate Research Fellowships Support Grants	$16,350
Ohio State University Columbus, OH 43212 Graduate Research Fellowships Support Grants	$113,500

John W. Miller
Baldwin-Wallace College
Berea, OH 44017

TPE-8651475
$53,621
12 months

"Extending the Elementary Science Curriculum to the Outdoors"

This pilot project is designed to expand and improve the Berea science education program by providing 30 teachers in grades 1-5/6 schools with training and support that will enable them to extend elementary science curriculum to the outdoors. The Cleveland Metroparks System will offer their excellent facilities for the program. Naturalists from the park staff as well as university science educators will serve as instructors in this multifaceted program.

Teachers will work for two weeks in a workshop setting which will include upgrading content on basic ecological concepts, discussions of grade level teaching strategies, and actual field work in the park system. Each teacher and a staff member will develop a unit plan for class field trips. Review sessions will be held in the winter to share experiences and plans for the spring field trips. Following the academic year, the program will be evaluated and the participating teachers will develop Field Trip Curriculum Guides for each grade level, 1-5. These guides will enable other school systems to provide adequate outdoor science education to their students through effective use of their park systems.

Frank Hassebrock
Department of Psychology
Denison University
Granville, OH 43023

CSI-8650708
$19,126
Psychology
30 months

"Microcomputer-Based Laboratory in General and Biopsychology"

One of the major goals of this project is to enhance the science education of students enrolled in General Psychology through extensive experience with contemporary and methodologically rigorous research in the discipline. The Denison faculty is developing a microcomputer-based laboratory which will provide students with first-hand experience in using the methodological procedures necessary for conducting research in the major content domains of psychology.

A second major goal is to enhance students' ability to comprehend human functioning from an integrated biological/behavioral perspective. The configuration of equipment modules (microcomputer, interface, and physiological instrumentation) enable sophisticated research for measuring cognitive and behavioral variables. The use of this equipment provides students with theoretical and methodological knowledge of human functioning from a bio-behavioral perspective. The Denison faculty is making a significant contribution to psychology education by returning to a vigorous experiment-centered freshman laboratory.

William J. Laughner, Jr.	CSI-8650296
Department of Biology	$38,144
Hiram College	Biology
Hiram, OH 44234	30 months

"Instrumentation for the Undergraduate Cellular and Molecular Biology Programs"

The Biology Department of Hiram College is engaged in a curricular program of enhancement called "Project Excellence." Under the aegis of this campaign, two electron microscopes (a transmission and a scanning EM) have been obtained recently for the expansion of the Molecular Biology program. This current project provides ancillary instrumentation to complete the electron microscope facility. An ultramicrotome, glass knife maker, critical point dryer, gold sputtering device, rotary vacuum pump and two specimen polishers round out the suite of instruments needed to prepare specimens for ultramicroscopic study. In addition, this award is providing an ultracentrifuge to broaden the college's capabilities for student laboratory experiences in molecular biology.

Douglas H. Clements	MDR-8651668
Michael T. Battista	FY 86 $331,705
Kent State University	FY 88 $195,352
Teacher Development & Curriculum Studies	24 months
233 Lowry Hall	
Kent, OH 44242	

"Development of a Logo-based Elementary School Geometry Curriculum"

In the current elementary school curriculum, little attention is devoted to developing students' geometric problem solving abilities, spatial thinking, or ability to analyze and reconceptualize substantive geometric ideas. Use of the Logo computer language has the potential of transforming both the content and method of the elementary school geometry curriculum.

This project will develop a new geometry curriculum for use in elementary schools and will create a set of Logo based classroom activities that promote the objectives of the curriculum. Expected outcomes will include a set of instructional materials, a book for teachers, recommendations for teacher training, and a videotaped program that will include exemplary lessons taught by teachers involved in the field test.

Michael D. Roadruck	TPE-8650147
Robert Frichs	$65,546
Lucas County Office of Education	12 months
Toledo, OH 43604	

"Towards Exocharmic Chemical Instruction-An Intensive, Experiential Dreyfus Outreach Workshop on Chemical Demonstrations, Computer Enhanced Instruction and Laboratory Activities"

This Leadership Activities Project will provide professional development for 30 outstanding chemistry teachers from northwest Ohio, southeast Michigan, northeast Indiana and elsewhere. The workshop will run for two weeks in late July and will be followed by five sessions throughout the school year. Skills in chemistry teaching will be renewed and developed through extensive, hands-on laboratory activities, provocative demonstrations and group discussion sessions. Participants will have access to the use of shop facilities and consultation, and they will make demonstration devices. They will also practice presenting demonstrations under the guidance of leaders in chemistry education and will critique the performance of one another. In addition, they will develop new skills in computer programming and interfacing in chemistry education. During the summer sessions and the academic year, consultants with special expertise in chemistry education will meet with the participants to develop skills and insights in a variety of special areas including problem solving, the development of conceptual and logical structures, and chemistry curricula. We anticipate that participants will rediscover the sense of excitement that initially drew them into the field of chemistry. We also anticipate that they will return to their classrooms not merely to talk about chemistry but to share their excitement and interest.

Edward E. Jones	TPE-8650152
Miami University - Oxford Campus	$192,543
Oxford, OH 45056	24 months

"Excellence in Elementary Science: A Project for the Lakota and Talawanda School Districts of Southwestern Ohio"

This proposal is a two-year Local and Regional teacher development project that will establish a collaborative partnership between Miami University and the Lakota and Talawanda school districts in Ohio. Seventy-two selected elementary teachers will participate in a four-week workshop with an academic year follow-up. The second year of the project will extend to teachers from other districts.

The workshop will emphasize the materials, procedures, and methods of the hands-on program, Curriculum Improvement Study (SCIIS), which has been purchased by the two districts. Another major focus of the project will be to establish model schools of elementary science instruction for use with undergraduate and graduate teacher preparation programs and for visitations from other school districts.

Wilma Faye Hollaway
Department of Chemistry
Mount Union College
Alliance, OH 44601

CSI-8650631
$9,930
Chemistry
30 months

"Course Improvements with a Computer-Interfaced High Performance Liquid Chromatograph"

This project will improve the instrumental component of the chemistry program at Mount Union College in two areas: high performance liquid chromatography (HPLC), and data acquisition through computer-interfaced instrumentation. A computer-interfaced HPLC system will enable students in organic chemistry, instrumental techniques, and undergraduate research to: (1) gain laboratory experience with the capabilities and applications of HPLC, (2) investigate a wide range of chemical problems which are best studied using HPLC techniques, and (3) work with a computer-interfaced instrument in chemical analysis.

Robert B. Teese
Department of Physics
Muskingum College
New Concord, OH 43762

CSI-8650450
$12,210
Physics
30 months

"Development of Computer-Based Teaching Laboratories"

This project will develop a set of pedagogically sound microcomputer-based laboratory experiments for beginning physics courses. In addition, it will introduce computer interfacing and control into the advanced physics laboratories. To achieve these objectives, Muskingum will purchase computers with a laser printer, a microcomputer network for the beginning labs and computer-interfaced measurement instruments for the advanced labs. The microcomputers in the beginning labs will include interfaces that turn them into fast, accurate, multipurpose lab instruments that beginning students can use with ease. The interfaces for the advanced lab experiments will allow the students to design and carry out computer-run experiments. For both beginning and advanced labs, the laser printer will provide high quality graphic output from which the students will extract data. This project will improve the physics program by making the labs more up-to-date, more instructive and more interesting for the students.

Sister Jeanmarie DeChant	CSI-8650932
Department of Chemistry	$18,000
Notre Dame College of Ohio	Chemistry
Cleveland, OH 44121	30 months

"Enhanced Laboratory Capabilities with Fourier Transform Infrared Spectroscopy and Computer Interfacing"

The chemistry education of undergraduate students at Notre Dame College of Ohio will be enhanced by laboratory experience with a state-of-the-art Fourier transform infrared spectrophotometer. This instrument will allow students in Organic Chemistry to follow reaction progress and identify reaction products; in Spectrometric Methods, to analyze "real-world" mixtures; in Physical Chemistry, to define molecular structure and thermodynamic properties; in Advanced Inorganic Chemistry, to observe metal-ligand interaction and bonding.

Using a computer to interface with other laboratory instrumentation, the students will develop facility with computer control of instrumentation and computerized data acquisition and analysis. In particular, students in Electronic Instrumentation and Analytical Methods courses will learn to apply modern computer technology to the chemistry laboratory.

This women's college makes special efforts to encourage and enhance the chemistry education of women undergraduates, including minorities and handicapped students. Through this project, the college will continue its contribution to the education of women scientists. Its chemistry students will develop expertise in using modern laboratory instrumentation and computers to solve chemical problems, and will capture the excitement and vision of modern chemistry.

Thomas F. Sherman	CSI-8650874
Department of Biology	$24,458
Oberlin College	Biology
Oberlin, OH 44074	30 months

"Instrumentation for Improving Undergraduate Laboratories in Respiratory Physiology"

This project seeks to improve undergraduate studies of vertebrate physiology by adding automated equipment for monitoring respiratory function. The Jaeger Ergo-Oxyscreen System and Pneumoscope acquired through this grant will make it possible for Oberlin College's Biology faculty to develop new laboratory experiments in human respiration. (Experimental studies of the human body have proved to be particularly effective in stimulating learning). The new experiments enable undergraduate students to make detailed analyses of pulmonary function and energetics in the human body as functions of work load, body aerobic training, and environmental conditions, analyzing such parameters as respiratory air flow, respiratory oxygen, CO_2 concentrations, and heart rate.

Jerry A. Jenkins	CSI-8650729
Department of Chemistry	$12,129
Otterbein College	Chemistry
Westerville, OH 43081	30 months

"Infrared Spectroscopy in the Undergraduate Laboratory"

Computerized infrared spectroscopy is widely used by scientists in many fields for a variety of purposes, from quality control of industrial products and monitoring of environmental contaminants to theoretical studies of the basic nature of molecules. Eight new infrared spectroscopy experiments are being introduced into the general, organic, analytical, physical and instrumental chemistry courses at Otterbein College as a result of the recent acquisition of an infrared spectrophotometer with computer and spectral processing software attachments. This development is significantly improving undergraduate laboratory instruction by allowing students to gain experience with this instrumental technique.

Patrick K. Williams	TPE-8651502
C. J. Ritter	$98,893
University of Dayton	Biology/Geology/Ecology
Dayton, OH 45409	18 months

"Leadership Workshop in Field Biology and Geology for Secondary Teachers"

This Leadership Activities project will provide professional development for 20 outstanding junior and senior high school science teachers. The grant provides support for the continuation and further development of a six-week field biology and geology workshop conducted by University of Dayton scientists. Emphasis will be on applied biology, field ecology, and environmental geology. During the first three weeks the principles of ecology and geology will be introduced with intensive field trips to natural sites within the local environments of the schools. The final two weeks of the summer program will include intensive work at high altitude ecological and geological sites. Several high altitude researchers will be involved in working with the teachers during this time.

Earlier versions of this workshop have been very successful, and this summer program will emphasize the importance of field-based activities for students in their own environment. Among other things, the project directors will talk with the principals of each participating teacher to ask for administrative support and to emphasize the importance of field trips for students. The program includes an extended academic phase that will result in the preparation of instructional modules. Participants will meet together during the academic year to discuss progress, there will be several field trips to local resource sites, and the participants will be expected to provide workshop outreach to others in their schools and communities. In addition, they will receive 10 semester hours of graduate credit, certificates of achievement, and will be honored by local media.

OKLAHOMA

Presidential Awards for Excellence in Science and Mathematics Teaching

Margaret S. Butler
Mathematics
Bartlesville Mid-High School
Bartlesville, OK 74006

Patsy Roller
Science
Clyde Boyd Junior High School
Sand Springs, OK 74063

Fellowships

Individual Award for Foreign Tenure Graduate Research Fellowship	$17,100
Oklahoma State University Stillwater, OK 74078 Graduate Research Fellowships Support Grants	$65,400
University of Oklahoma Norman, OK 73019 Graduate Research Fellowships Support Grants	$16,350

Steffen H. Rogers
University of Tulsa
Tulsa, OK 74104

TPE-8552371
$192,379
Biotechnology
24 months

"A Model System for Enhancing Regional Awareness of Educational and Economic Opportunities in Biotechnology"

This project will improve the knowledge and teaching backgrounds of 20 elementary and secondary teachers of biology in the states of Oklahoma, Kansas, and Missouri. The project workshop is intended to provide: 1) methods, materials, and experience for practical laboratory exercises in biotechnology, and 2) current information and materails. The project will be conducted as separate four-week workshops for each of two years.

Lecturers from university and industrial settings who are currently using high-tech biology will present to the participants the newly-developed ideas and methodologies in biology.

OREGON

Presidential Awards for Excellence in Science and Mathematics Teaching

Linda Foreman
Mathematics
West Linn High School
West Linn, OR 97068

Lowell G. Herr
Science
The Catlin Gabel School
Portland, OR 97225

Fellowships

Oregon Graduate Center Beaverton, OR 97006 Graduate Research Fellowships Support Grants	$16,350
Oregon Health Sciences University Portland, OR 97201 Graduate Research Fellowships Support Grants	$16,350
Oregon State University Corvallis, OR 97331 Graduate Research Fellowships Support Grants	$49,050
University of Oregon - Eugene Eugene, OR 97403 Graduate Research Fellowships Support Grants	$49,050

Joseph P. Bartelme
Department of Electronics Engineering Technology
Oregon Institute of Technology
Klamath Falls, OR 97601

CSI-8650545
$49,750
Engineering
30 months

"A Universal Microprocessor Development System for Engineering Students"

Oregon Institute of Technology will purchase ten microprocessor development systems for students taking microprocessor and senior project courses. The system includes an IBM PC-AT computer engine, a universal microprocessor emulator, software, and a printer. The universal microprocessor emulator was chosen to obtain maximum flexibility in choosing the microprocessors to be emulated. The unit allows changing microprocessors without having to change emulators or computer engines. With the acquisition of the ten development systems, the microprocessor and senior project instruction will be compatible with contemporary practices of industry.

James Currie
Department of Chemistry
Pacific University
Forest Grove, OR 97116

CSI-8650463
$7,664
Chemistry
30 months

"Ultraviolet/Visible Spectrophotometer for Undergraduate Chemistry"

This project will incorporate into the chemistry program at Pacific University a computer-controlled scanning ultraviolet/visible spectrophotometer with software and accessories necessary to perform a variety of experiments. This instrument will replace an obsolete spectrometer, and will expand substantially the range of experiments possible with the enhanced capabilities of the new equipment. Students will use the instrument for quantitative and qualitative analysis, and for the study of reaction rates, chemical equilibria, and electronic structure of molecules.

Michael A. Fiasca
Portland State University
Portand, OR 97207

TPE-8550351
$62,194
Earth/Physical/Biology
15 months

"Mount St. Helens - Honors Workshop for Science Teachers"

This Leadership Activities program will provide enhancement and professional development experiences for 24 teachers in the earth, physical, and biological sciences, who have demonstrated potential leadership abilities in science education. The participants will be recruited Nation-wide with special efforts to include individuals who have been selected as presidential scholars or identified as exceptional science teachers. Three high-ability geology majors, who have not yet opted for a science teaching career, will be invited to participate in a workshop for credit. It is hoped that this involvement will kindle an interest in a science teaching career.

The objectives of this program are to provide formal classroom instruction on the evolution of the Cascade volcanoes including magma genesis and plate tectonics, and to include information about the economic, social and environmental impacts of the eruptions of Mt. St. Helens from 1980 to present. The instructional vehicles will be field trips, field exercises, laboratory exercises, discussions, computer simulations and group work. The workshop is scheduled for two weeks August 4-16, 1986. Most of the formal workshop instruction will take place at the University with provision for field trips and field work taking place on site at Mount St. Helens and other locations.

Follow-up activities will include participants sharing their acquired knowledge and skills with colleagues and students and expanding the literacy of the community at large about science. Project information and results will be available through commercial and participant-prepared materials, both photographic and textual.

Marjorie Enneking	TPE-8650102
Portland State University	$356,314
Portland, OR 97207	Mathematics
	20 months

"Alternative Approaches to Teaching Secondary Mathematics"

This Leadership Activities project, centered at both Portland State University and Oregon State University, will provide professional development and programmatic leadership expertise to 60 "leader teacher" in the upper Northwestern United States. An additional 60 "impact teachers" will participate in a 3 week summer program to enhance both their mathematics backgrounds and teaching skills.

The leader teachers will also provide in-service education programs in their local area for all mathematics teachers. A set of demonstation videotapes will be produced for dissemination beyond the schools involved in the project. Extensive follow-up by project staff will do much to insure high quality implementation and in-service efforts. A conference meeting in 1987-88 will serve to evaluate the impact of the project and provide the opportunity for determining the continuing activities necessary for quality mathematics education in the schools.

The "leader teachers" have already participated in an Honors Workshops for mathematics teachers as part of a former NSF project developed by the Principal Investigators. In addition to conducting a need assessment in their districts, these teachers will identify the "impact teachers" with whom they are going to work both in the summer program and in their schools. The leader teachers will participate in a one-week intensive workshop, prior to that for the impact teachers, in which they will develop plans for their in-service and programmatic leadership activities during following year. Consultants as well as program staff will provide expertise and assistance in these endeavors. An extensive evaluation plan to measure effectiveness of the program for both teachers and students has been developed.

Hongjin Eric Kim	CSI-8651075
Department of Electrical Engineering	$50,000
University of Portland	Engineering
Portland, OR 97203	30 months

"Automated Test Equipment for the Measurement of Microelectronic Device Parameters"

The Electrical Engineering Department at the University of Portland will acquire a Hewlett-Packard Semiconductor Parameter Analysis System and an associated Tektronix Programmable Instrumentation System. With this data acquisition system students will be able to characterize integrated circuits and extract and verify circuit parameters. To facilitate the computations the system will be connected with a VAX 11/750 computer in the Computer Aided Engineering laboratory. SUXES and SPICE software, both available on the VAX 11/750 computer, will be used in conjunction with this equipment. The equipment will first be used with commercially available IC's. In the near future special chips for this purpose will be developed. The instrumentation is part of a general effort to upgrade and automate the instrumentation in the Electrical Engineering laboratories, and is also a part of a planned development of a strong laboratory curriculum in microelectronics in the Electrical Engineering Department.

PENNSYLVANIA

Presidential Awards for Excellence in Science and Mathematics Teaching

Carl C. Duzen
Science
Lower Merion High School
Ardmore, PA 19003

Catherine A. Jatkow
Mathematics
Schenley High School Teacher Center
Pittsburgh, PA 15213

Fellowships

Bucknell University Lewisburg, PA 17837 Graduate Research Fellowships Support Grants	$16,350
Carnegie Mellon University Pittsburgh, PA 15213 Graduate Research Fellowships Support Grants	$315,050
Lehigh University Bethlehem, PA 18015 Graduate Research Fellowships Support Grants	$7,620
Penn State University Central Office University Park, PA 16802 Graduate Research Fellowships Support Grants	$162,000
Temple University Philadelphia, PA 19122 Graduate Research Fellowships Support Grants	$40,180
University of Pennsylvania Philadelphia, PA 19104 Graduate Research Fellowships Support Grants	$359,660
University of Pittsburgh Pittsburgh, PA 15260 Graduate Research Fellowships Support Grants	$49,050

Andrew D. Jorgensen
Department of Chemistry
Allegheny College
Meadville, PA 16335

CSI-8650713
$21,235
Chemistry
30 months

"The Introduction of High Performance Liquid Chromatography into the Chemistry Curriculum of Allegheny College"

This project will introduce high performance liquid chromatography (HPLC) into the chemistry curriculum of Allegheny College. A significant instrument acquisition program is near completion, and this project will bring the institution one major step closer to that goal. This computer-controlled HPLC system is suitable for both accurate analytical work and mixture separation. Included are detectors that indicate the presence and quantities of virtually all common chemical substances. The entire operation will be run from a data system that can simultaneously direct the instrument through the specified analysis routine and collect the data that result. It also has the capability to retrieve and interpret data from previous experiments during the entire process.

As a primary objective, the HPLC will become an integral part of the instrumental analysis course. In addition, student research will be aimed at the development of better procedures for optimizing analytical conditions. Since there was previously no HPLC equipment at the college, the project will, for the first time, provide the opportunity for students in chemistry and other departments of the natural sciences to use this very practical and versatile technique.

Joseph C. Colosi
Department of Biology
Allentown Col. of St. Francis de Sales
Center Valley, PA 18034

CSI-8650595
$9,005
Biology
30 months

"Plant Growth Chambers to Enhance Undergraduate Laboratories and Student Research"

The addition of two environmental chambers to the Biology Department facilities is enhancing laboratory courses (Botany, Ecology, Physiology, Developmental Biology) and student research (required of all seniors for graduation). The two chambers, in conjunction with a biological incubator already available, allow the faculty to establish controlled environments in which experiments with plants and animals can be performed. The chambers are being used in three ways: to compare responses of plants and animals to different environments; to physiologically prepare organisms for experimental treatments; and to maintain organisms in controlled conditions to reduce extraneous environmental variation in experiments in which environmental factors are not designed to be experimental variables.

By expanding the types of experiments available to this department and especially by allowing comparative studies of environmental effects on organisms, these chambers greatly enhance undergraduate biology laboratories. Good, clear results from lab exercises with living plants and animals allow students to gain better perceptions of the concepts they read about or hear about in lectures. For student research, the chambers increase precision and accuracy and significantly expand the range of possible studies.

Margaret E. Kastner	CSI-8650293
Department of Chemistry	$21,054
Bucknell University	Chemistry
Lewisburg, PA 17837	30 months

"Precession Camera for X-Ray Crystallography in Undergraduate Chemistry Courses and Research Projects"

The undergraduate chemistry program at Bucknell University will be enhanced significantly by providing students with laboratory experience in crystallography. This project will install an X-ray generator and a precession camera with Cu and Mo sources. The precession camera will be used at all levels of undergraduate instruction for projects not previously possible. In general chemistry, a library of precession photographs and exercises will be generated to enable students to visualize the reciprocal lattice and crystal symmetry elements. In physical chemistry laboratory, undergraduates will obtain their own precession photographs and assign space groups. In undergraduate research, students will derive unit cell parameters and assign space groups for their own syntheses, preparatory to full single crystal structural determinations.

Jerud J. Mead	CSI-8651035
Department of Computer Science	$29,407
Bucknell University	Computer Science
Lewisburg, PA 17837	30 months

"A Virtual Machine Operating Environment for the Computer Systems Curriculum"

Bucknell University will significantly improve the Computer Science Department's ability to provide an environment for student and faculty/student projects by purchasing a micro-computer based system running UNIX. The system consists of a Sun Microsystems 3/160S server and three Sun 3/50M workstations, together with a large disk and other peripherals. This equipment will be used in a project involving students and faculty to develop a Virtual Machine Operating Environment (VMOE). The VMOE will be used in core courses as the basis for examples, by students in project-based elective courses and for independent student projects where the interactions of hardware and system software is the crucial issue. The system will be transportable to other institutions wishing to take advantage of the instructional benefits of the VMOE.

David Klahr	MDR-8554464
Department of Psychology	FY 86 $196,359
Carnegie-Mellon University	FY 88 $106,183
Pittsburgh, PA 15213	

"LOGO Debugging Skills: Analysis, Instruction and Assessment"

This research addresses the question of how an important computer programming skill -- debugging -- is acquired by elementary and middle-school children, and what the cognitive consequences are of acquiring that skill. One preliminary goal of the proposed research is the development of a well-specified and empirically-supported account of what a child has to know in order to debug a computer program. The proposed work extends preliminary studies of the debugging skills acquired during the course of a normal LOGO curriculum, and it provides for further assessment and elaboration of a computer-simulation model of the precise components of debugging skill.

The work will have several interacting components: (1) Empirical evaluation of the model based on a study of experienced programmers' debugging processes; (2) Further development of precise assessment procedures for determining what component skills a student has acquired; (3) Extending the model to a wider range of programming contexts; (4) Using the model to guide specific instructional procedures in teaching debugging skills; (5) Extending and applying a complete one-semester LOGO curriculum with an emphasis on instruction in an assessment of debugging skills; (6) Determining the extent to which debugging skills, once taught, can transfer to near and far tasks; (7) Construction of a model-based prototype debugging aid on a powerful graphics workstation.

Sister Grace Banks, Ph.D.	CSI-8650627
Department of Chemistry	$7,327
Chestnut Hill College	Chemistry
Philadelphia, PA 19118	30 months

"Improved Laboratory Instruction in Analytical Techniques and Research for Undergraduate Chemistry/Biochemistry Majors"

This project will introduce high performance liquid chromatography (HPLC) into biochemistry, organic chemistry, and instrumental analysis laboratory courses and research projects for undergraduate students at Chestnut Hill College. Chemistry and biochemistry majors will use a gradient HPLC system to study parameters in chromatographic separations; to separate and analyze natural products, pharmaceuticals, and various organic compounds which the students synthesize; and to pursue more varied research projects. Working with this important modern technique will broaden substantially the students' laboratory experience, and will help Chestnut Hill College continue to prepare women for careers in chemistry and biochemistry.

Jeffrey W. Niemitz	CSI-8650526
Department of Geology	$34,460
Dickinson College	Earth Sciences
Carlisle, PA 17013	30 months

"Instrumental Methods in Student Research Projects in Geology"

The analytical component of the geology program at Dickinson College is being enhanced significantly through the acquisition of an Energy Dispersive X-ray Fluorescence Spectrophotometer and the upgrading of an X-ray Diffraction System. With these instruments, which complement analytical instruments already on hand, student research projects are being conducted at three interrelated levels: 1) Introductory required courses (Mineralogy, Petrology, etc.), 2) Intermediate elective courses (Geochemistry, Economic Geology, etc.), and 3) Independent Study and Research. Each level acts as a basis for the next by incorporating the theory, operation and limitations of instrumental methods into a series of increasingly complex geologic problems.

C. Y. Cheng
Department of Chemistry
East Stroudsburg University
East Stroudsburg, PA 18301

CSI-8650559
$7,677
Chemistry
30 months

"Introduction of Ion Chromatography into the Chemistry Laboratory Curriculum"

This project will introduce undergraduate students at East Stroudsburg University to chromatographic techniques for efficient, simultaneous determination of ionic species. Students in instrumental analysis and environmental chemistry courses will learn techniques for the determination of anions such as chloride, fluoride, nitrite, nitrate, sulfate, and phosphate in parts-per-million quantities. The ion chromatography system will also be used by undergraduates in research projects which include investigating effects of acid rain, monitoring local potable water supplies, and studying the water chemistry of several lakes and streams in the Poconos.

Stanley J. Zagorski
Gannon University
Erie, PA 16501

TPE-8550521
$63,571
Computer/Environmental
12 months

"Computer Age Environmental Science Precollege Teacher Development"

This project will deliver in-service training to 30 middle school teachers in or near Erie, Pennsylvania. The participants will be introduced to modern ecological techniques and will also be instructed in the applications of microcomputers.

The program will consist of four phases. Phase I will be a two-week, full-time workshop during the summer. Phase II will consist of nine Saturday workshops during the first semester, and Phase III will consist of seven Saturday workshops during the second semester. During these workshops, the participants will develop Environmental Computer Units to be incorporated into their courses. Phase IV will be a four-week workshop for individual project presentations.

There will be extensive field trip activity during the first three phases of the project. Both Lake Erie and Presque Isle State Park are accessible for field studies and will be employed as study sites.

William E. Russey
Department of Chemistry
Juniata College
Huntingdon, PA 16652

CSI-8650895
$50,000
Chemistry
30 months

"Multi-Element Fourier Transform NMR Capability"

The goal of this project is to integrate into the chemistry laboratory curriculum multi-element Fourier transform NMR capability. Acquisition of an 80-MHz Fourier transform NMR will facilitate the research efforts of the undergraduate chemistry majors, and will allow students to measure and interpret NMR spectra of a number of elements besides hydrogen, such as carbon-13, phosphorus-31, and cobalt-59. Students will be introduced to FT-NMR with routine applications in the introductory organic chemistry laboratory, and will progress in more advance courses through increasingly sophisticated and specialized applications of this powerful experimental tool. Chemistry students will first use the instrument independently in the sophomore-level course Synthesis of Chemical Compounds. In the course Interpretive Spectroscopy, the FT-NMR will provide students with rigorous experience in the application of NMR spectra to structural problems. In laboratory courses in Chemical Analysis, Chemical Instrumentation, and Physical Measurements, students will study and exploit fast Fourier transform techniques and the computer capability of the instrument. Through this new experimental capability, the instrument will produce a significant improvement in chemistry education at Juniata College.

Chester J. Van Tyne	CSI-8650557
Department of Metallurgical Engineering	$19,748
Lafayette College	Engineering
Easton, PA 18042	30 months

"Acquisition of an Image Analysis System"

The acquisition of a state-of-the-art Image Analysis System has strengthened the Metallurgical Engineering program at Lafayette College by allowing the collection, quantification, and analysis of data obtained from a magnified optical image of materials under investigation, with applications in a variety of engineering and scientific fields. The system is used in undergraduate laboratory exercises in metallurgical engineering, in an interdisciplinary course in analytical methods, and in undergraduate Honors projects in science and engineering. This project improves undergraduate education in science and engineering, particularly in the areas of computer acquisition of experimental data and the statistical analysis of data.

Dale James Erskine	CSI-8650662
Department of Biology	$14,764
Lebanon Valley College	Biology
Annville, PA 17003	30 months

"Improvement of Undergraduate Laboratory Experience in Animal Physiology"

At Lebanon Valley College, the Animal Physiology laboratory historically has emphasized human physiology at the organismic level. The current instructor (director of this project) has taken steps to move the course in a more comparative and more cellular direction. Laboratory exercises now include enzyme kinetics and small mammal metabolism. To implement this change effectively, more sophisticated instrumentation was needed to continue the development of new exercises. This project facilitates the introduction of three exercises which are designed to elucidate basic physiological principles and to teach basic physiological techniques. With the new microcomputer-driven instruments provided through this award, it is possible to expose students in the teaching laboratory to such topics as membrane potentials, active transport of sodium ions, and basic principles of neurobiology. The new instrumentation is broadening the range of student laboratory experience, familiarizing the students with advanced data gathering techniques, and expanding the opportunities for independent student research projects. The majority of enrollees are biology or biochemistry majors who plan to pursue graduate degrees in biology/biochemistry or to attend professional schools. Approximately one-fourth of the total majors in biology and biochemistry, excluding freshmen, enroll in this pivotal course each spring semester.

Frank T. Kuserk	CSI-8650225
Department of Biology	$31,000
Moravian College	Inter & Multidiscipl.
Bethlehem, PA 18018	30 months

"Enhancement of Multidisciplinary Science Laboratories Using Computer-Interfacing Technology"

Laboratory exercises employing computer-interfaced scientific instrumentation are being developed for nine courses in the Departments of Biology, Chemistry, Physics and Earth Sciences, and Psychology at Moravian College. Enhancement of laboratory experience is the objective of the effort. The anticipated outcome is the education of students who, when confronted with an experiment potentially involving computer assistance, are capable of designing and implementing the experiment in a reasonable and effective manner. This project is directed primarily at students majoring in these scientific disciplines, although non-majors and science education majors will also be affected.

Donald W. Shive	CSI-8650784
Department of Chemistry	$8,903
Muhlenberg College	Chemistry
Allentown, PA 18104	30 months

"Integrating High Performance Liquid Chromatography into Undergraduate Chemistry Education"

The project will acquaint undergraduate chemistry students at Muhlenberg College with high performance liquid chromatography (HPLC) and its uses and limitations in chemical analysis. Several HPLC instruments will be available so that small groups of students can work on chemical separation problems without interruption. The problems assigned will be selected from the areas of clinical, forensic, and environmental chemistry: for example, the determination of phenol in wastewater, metabolites in blood, and components in over-the-counter drugs. This will give the students a balanced view of the importance of modern chromatography in the analytical laboratory, and better prepare them for graduate study or industrial work. Students will design and discuss experimental plans for their laboratory work, providing a foundation for future experimental design and work in the laboratories.

Frank Swetz	TPE-8550425
Pennsylvania State University - Capitol Campus	$108,214
Middletown, PA 17057	18 months

"Mathematical Modeling in the School Curriculum: An Honors Workshop for Secondary Mathematics Teachers in the South-Central Pennsylvania Region"

This Leadership Activities project will provide enhancement and professional development experiences for 35 exemplary secondary school mathematics teachers from the south-central Pennsylvania area. The overall project goals involve the updating and deepening of the participants' mathematical backgrounds and teaching methodology, the networking of the participants, the conduct of in-service workshops by the participants in their home schools, the dissemination of the project materials and results to nearby school systems, and the investigation of the modelistic approach within a well-planned documentation, assessment and evaluation effort.

Participants will be selected through recommendations provided by educational specialists in the Intermediate Units, which provide services to 72 school districts. Participants will study the theory and practice of mathematical modeling, as well as the teaching of school mathematics emphasizing mathematical modeling and problem solving during a 5-week workshop on the Capitol Campus. In small group sessions they will work together to apply their new understandings to develop plans and materials for implementing mathematical modeling into their own teaching. Further, they will collaboratively plan for the half-day workshop each is required to conduct for their school colleagues. During the Autumn follow-up, they will be observed and assisted by project staff in their own classrooms. They will conduct the workshop for peers, attend three half-day symposia on mathematical applications presented by guest industrial mathematicians, and prepare written reports of all project activities. The participants will be recognized and honored, and they will earn eight graduate credits.

Robert J. Mathieu	CSI-8650815
Department of Geography	$17,000
Slippery Rock University	Earth Sciences
Slippery Rock, PA 16057	30 months

"Upgrading the Undergraduate Experience with the Earth Resources Data Analysis System (ERDAS)"

The undergraduate program for majors and minors in the Department of Geography and Environmental Studies is being expanded, updated and strengthened at Slippery Rock University through the utilization of the Earth Resources Data Analysis System (ERDAS). This powerful, yet moderately priced system includes a microcomputer-based (IBM PC/AT-enhanced) work station which supports peripheral hardware and supporting software. Students are learning how to generate digital data bases (using a Digitizing Tablet and Video Digitizer) in order to analyze spatially distributed phenomena (with Image Processing, Geographic Information System Module and Topographic Module) in evaluating natural resources. Also provided is instruction in data plotting in a cartographically accurate format using the Color Hardcopy Module.

Cynthia Walter	CSI-8650652
Department of Biology	$23,742
Saint Vincent College	Inter & Multidiscipl.
Latrobe, PA 15650	30 months

"Improvement in the Molecular Biology Component of the Biology and Chemistry Laboratory Curricula"

Considerable knowledge of molecular mechanisms in biological and environmental phenomena has been recently incorporated into the St. Vincent College curricula in biology and chemistry. Several new laboratory exercises have been introduced in each of the advanced biology and chemistry courses in which molecular mechanisms play a central role (e.g. Cell Biology, Genetics, Ecology, Instrumental Analysis). New techniques include methods of purification (e.g. high speed centrifugation and column chromatography) and methods of analysis (e.g. absorption spectroscopy). The addition of the appropriate instrumentation for purification and analysis allows all science students to have direct experience with the equipment commonly used in molecular studies, and better prepares them for graduate studies and professional work in the health and environmental sciences.

Robert E. Nylund
Department of Chemistry
Susquehanna University
Selinsgrove, PA 17870

CSI-8650471
$20,650
Chemistry
30 months

"Nuclear Magnetic Resonance Spectrometry in the Chemistry Curriculum"

The chemistry department at Susquehanna University introduces undergraduate students to "hands-on" use of modern instruments throughout their four-year program. Recently the department has begun interfacing major laboratory instrumentation to computers. Currently, students use nuclear magnetic resonance spectrometry primarily for identification and characterization of organic compounds in the sophomore organic course. This project will extend students' experience with NMR to include computer interfacing and sophisticated applications in physical chemistry, inorganic chemistry, instrumental analysis, biochemistry, advanced organic chemistry, and undergraduate research. Students will use a computerized data base of NMR spectra for direct comparison of known spectra with spectra measured in their experiments. In addition, they will have direct experience with the advantage of multiple scans and computer enhancement of instrument signals. This project will give the students more complete knowledge of the varied applications of NMR spectrometry and prepare them to use modern computer-controlled instruments in industry and postgraduate research.

Eugene A. Klotz
Swarthmore College
Department of Mathematics
Swarthmore, PA 19081

MDR-8550459
FY 86 $332,833
FY 87 $237,203

"Visual Geometry: A Multi-Media Approach"

This project will develop video, computer, and print materials that will enhance the teaching of geometry in secondary schools. The central medium will be broadcast-quality videotapes, which will consist of computer generated animation accompanied by narration and some text. Workbooks will allow the video materials to be used either for classroom instruction or for independent study. Related computer programs, together with high quality documentation, will also be developed, allowing students to explore geometric concepts interactively.

A useful byproduct of the project will be a "geometer's sketch pad", a program that will enable geometers working with inexpensive microcomputers to sketch geometric figures in two and three dimensions and to apply geometric transformations that will permit visualization from different perspectives. This program will be used by the project staff for prototyping animation sequences. It will also be of interest to other mathematicians and will be appropriate as an instructional tool for use with gifted students.

Robert M. Aiken
Temple University
Philadelphia, PA 19122

TPE-8550553
$226,699
Computer
24 months

"Development of a Model Program for Preparing Computer Science Teachers at the Secondary School Level"

This project will deliver in-service training to 40 secondary teachers of mathematics, 20 participants attending each of two years. The participants will be selected from the greater Philadelphia area. The two-year project will provide courses in computer science, instructional design practicums, a series of workshops, and a series of networking sessions.

A series of 1/2 day workshops for principals, presidents of the local parent support group, and teachers will be held prior to the beginning of the courses.

Three courses in computer science will be taught for each group of participants. These courses will be: (1) A First Course in Computer Science (2) Structured Programming with Pascal, and (3) Advanced Programming Concepts.

The Instructional Design course will allow the participants the opportunity to design and develop learning resources which they will use in their classrooms.

The courses will be offered during the summer and the academic year.

During the school year, monthly meetings will be held for the participants and those already teaching computer science courses. The meetings will provide further instruction and support for those teaching computer science.

Leroy W. Dubeck
Temple University
Department of Physics
Broad & Montgomery Streets
Philadelphia, PA 19122

MDR-8650104
FY 86 $18,900
12 months

"A Nationwide Publication for Science Teachers: Teaching Science Through Science Fiction Films"

This project will create a student workbook and teacher's guide that will enable ninth and tenth grade teachers to incorporate science fiction films into their teaching of general science. Begun in 1984 with NSF support, the teacher's guide provides an analysis of science fiction films with respect to physical principles that are either illustrated or violated in the films. The current project will improve this guide in preparation for publication and will develop accompanying student materials.

The potential use of science fiction films in science classrooms is enhanced by the availability of many of the films on videotape and by the wide availability of videocassette players both in the schools and in homes. Preliminary evidence suggests that student attitudes toward science are affected positively by use of the materials and that students' motivation to continue studying science is increased.

Donald E. Neville
Temple University
Philadelphia, PA 19122

TPE-8650160
$40,756
Physics
18 months

"Demonstration and Computer Workshop for Secondary School Physics Teachers"

This award funds a program for those teachers in the Greater Philadelphia area who have little formal background in either physics or physics teaching. The project will provide a repertoire of lecture-demonstrations and experiments to be used in the classroom.

The workshop will be offered to 20 participants. Fourteen sessions, seven in the Fall and seven in the Spring, will be offered during the late evening hours. Each session will consist of one hour of lecture and two hours of laboratory work.

Each session will present and explain basic lecture material, demonstration material, and laboratory experiments. In addition, participants will learn to maintain equipment, to use the computer as a laboratory tool, and will have an opportunity to bring in and identify new equipment.

Trudy A. Dickneider
Department of Chemistry
University of Scranton
Scranton, PA 18510

CSI-8650456
$35,431
Chemistry
30 months

"Introduction of Gas Chromatography/Mass Spectrometry into the Undergraduate Chemistry Curriculum"

This project aims to introduce gas chromatography/mass spectrometry (GC/MS) capability into the undergraduate chemistry curriculum at the University of Scranton, both in course-related laboratory work and in independent student research. To accomplish this aim, a benchtop gas chromatograph/mass spectrometer will be purchased. The instrument will be configured for capillary GC, and will be supported by a complete data system including a spectral library. It will be used by undergraduates to learn principles and applications of GC/MS in the organic, instrumental and advanced inorganic course sequences, and to gain experience with computer-controlled data acquisition and analysis. It will also provide students with a powerful modern technique for use in their varied research projects, many of which involve significant work in drug analysis and petroleum exploration.

Roger W. Mustalish
Department of Health
West Chester University
West Chester, PA 19383

CSI-8650834
$29,000
Inter & Multidiscipl.
30 months

"The Integration of State-of-the-Art Computer-Aided Analytical Instrumentation/Data Analysis into an Undergraduate Environmental Curriculum"

With the recent acquisition of several major pieces of instrumentation, the Environmental Health Department at West Chester University is establishing a computer-aided environmental laboratory which will be integrated into the University's undergraduate environmental curriculum. The instruments include an atomic absorption spectrophotometer, a gas chromatograph, and a UV/visible spectrophotometer with appropriate computer interfacing to provide instrument control and data analysis and reporting. The project is providing a stimulating, advanced learning environment in which students study environmental pollution and methods of control. Ten environmental courses are being improved, a new advanced environmental monitoring and analysis course is being developed, and a laboratory manual will be written and published. Significant improvements in undergraduate instruction in environmental science are being implemented, and scientists better able to solve the Nation's complex environmental problems are being educated.

Michael J. Chejlava	CSI-8650678
Department of Chemistry	$21,100
Westminster College	Chemistry
New Wilmington, PA 16172	30 months

"A Modern Fourier Transform Infrared Spectrometer for a Project-Based Advanced Laboratory"

This project will incorporate a modern, computer-controlled Fourier transform infrared spectrometer into the established project-based Advanced Laboratory program at Westminster College. This program, developed over the last fifteen years, has been very successful in the preparation of students for a wide range of scientific and technical careers. The new instrument will replace an aging and failing spectrometer whose capabilities are very limited. This project will enable students to gain experience with a modern computer-controlled spectrometer and to use all of the capabilities inherent in its design. The Advanced Laboratory program and Organic Chemistry laboratory will be improved by the addition of many new techniques not previously available: computer data handling, spectral database searching, reflectance sampling methods, and high resolution vibrational-rotational spectra for the study of gases. These capabilities will allow students to study molecular structures and properties in a variety of chemical, biological, and environmental samples. Almost 50% of the students affected by this project are women preparing for science teaching, scientific or technical careers.

Aline M. Harrison	CSI-8650418
Department of Chemistry	$15,725
York College of Pennsylvania	Chemistry
York, PA 17405	30 months

"Atomic Absorption/Flame Emission and Ultraviolet/Visible Spectrophotometers to Upgrade Analytical Chemistry Courses for Career-Oriented Liberal Arts Students"

This project aims to upgrade the analytical chemistry education of undergraduate students at York College of Pennsylvania by incorporating the use of computer-controlled UV/visible and atomic absorption spectrophotometers into the laboratory coursework of the analytical chemistry sequence. In the first analytical course, students will use the computer-controlled instruments to study modern techniques of chemical analysis similar to those performed in industrial laboratories. The instrumentation will also enhance the second analytical course, in which students learn principles of instrument design as well as instrumental analytical techniques.

PUERTO RICO

Presidential Awards for Excellence in Science and Mathematics Teaching

Esilda M. Alvarado
Science
Blanca Malaret High School
Sabana Grande, PR 00747

Gilberto Quintana
Mathematics
Robinson School
Santurce, PR 00907

Manuel Gomez
University of Puerto Rico
Rio Piedras, PR 00931

TPE-8550935
$137,743
Chemistry/Physics
12 months

"Extension of the Puerto Rico Resource Center: Precollege Component"

The Puerto Rico Resource Center for Science and Engineering has developed a program for assisting teachers at both the elementary and high school levels. The Center will offer the following three workshops:

- Workshop I for Secondary School Teachers on the Supervision of High School Research;
- Workshop II for Elementary School Teachers on How to Develop Teachers for the Teaching of Science; and
- Workshop III for High School Teachers on How to Develop Teachers for the Teaching of Chemistry and Physics.

Workshop I will help teachers develop the necessary skills to serve as advisors of scientific research projects proposed by students for presentation at science fairs. Fifteen secondary school teachers will attend a three-week session during the summer of 1986. Two follow-up sessions, one each semester, will be held to analzye students' research projects and to constructively help the teacher-advisor bring these projects to fruition.

Workshop II will help elementary teachers develop the content and methodology necessary to teach and understand hands-on work in the classroom. Workshop III will help high school teachers in physics and chemistry improve their approach to teaching science.

Twenty teachers will attend each workshop at each site. Follow-up activities will be provided at four sessions each semester.

Carmen I. Rivera
Department of Natural Sciences
University of the Sacred Heart
Santurce, PR 00914

CSI-8650958
$22,193
Biology
30 months

"Enhancement of the Laboratories for Immunology and Related Cell and Molecular Biology Courses"

The goal of this project is to restructure the existing Immunology course so as to include a laboratory section, and to update and expand the quality of the laboratory experiences offered in such other courses as Microbiology, Biochemistry, Physiology, Hematology, and the Undergraduate Seminar, through the purchase of equipment needed to improve the curricular contents. These changes are expected to enable students to meet the challenges of a technological society. Among the instruments required to accomplish these course improvements are chromatographic, fractionating, ultraviolet analysis and recording equipment, electrophoretic apparatus for the analysis and isolation of antigens, and two good research microscopes for the study of the histology of lymphoid tissues. This project is having an impact on Hispanic students majoring in science and those in the University's pre-health track.

RHODE ISLAND

Presidential Awards for Excellence in Science and Mathematics Teaching

Louis A. Ventura
Science
Bishop Hendricken High School
Warwick, RI 02889

Harold M. Weymouth
Mathematics
Portsmouth Middle School
Portsmouth, RI 02871

Fellowships

Brown University Providence, RI 02912 Graduate Research Fellowships Support Grants	$62,410

Rulph Chassaing
Dept. of Electrical & Computer Engineering
Roger Williams College
Bristol, RI 02809

CSI-8650204
$9,591
Engineering
30 months

"Digital Signal Processing Applications"

The Engineering and Technology Division will purchase single-board computers, interface boards, and a development system for use in teaching digital signal processing. The TMS 32010 Evaluation Module will be used in conjunction with the Analog Interface Board to perform several experiments and projects in digital filtering and spectral analysis. Finite and infinite impulse response filters (low pass, high pass, band pass and band stop) as well as fast Fourier transforms will be used. The senior project course will provide a medium for many students to apply the techniques of digital signal processing, in particular in the areas of communication and control, speech, and image enhancement. Such a project will offer the senior students hands-on experiences and a more comprehensive understanding of new technologies.

SOUTH CAROLINA

Presidential Awards for Excellence in Science and Mathematics Teaching

Nancy B. Bane
Science
Spartanburg High School
Spartanburg, SC 29302

Janice W. Brown
Mathematics
Richland Northeast High School
Columbia, SC 29223

Fellowships

Clemson University Clemson, SC 29631 Graduate Research Fellowships Support Grants	$32,700

Patricia G. Lincoln
Department of Science & Mathematics
Coker College
Hartsville, SC 29550

CSI-8650570
$37,197
Inter & Multidiscipl.
30 months

"Improvement of the Laboratory Experiences for Upper-Division Chemistry and Biology Students"

The Department of Science and Mathematics at Coker College will incorporate into its curriculum more laboratory experience for its upper-division chemistry and biology majors. This project adds a course in quantitative chemistry and new laboratory exercises to the extant courses in physical chemistry, cell physiology and plant physiology.

Robert C. Frankis, Jr.
Department of Biology
The College of Charleston
Charleston, SC 29424

CSI-8650767
$16,852
Biology
30 months

"Improvements in an Undergraduate Molecular and Cellular Biology Laboratory"

The primary objective of this project is to update laboratory instruction in the field of molecular biology. The new equipment provides experience with technologies commonly employed in a modern research laboratory for the isolation and characterization of proteins and nucleic acids. Techniques such as electrophoresis, isoelectric focusing, chromatography and spectrophotometry are associated with such currently productive fields as genetic engineering and biomedical research. In this way, students are enjoying a greatly increased exposure to techniques which prepare them for work at the forefront of science.

William F. Junkin, III
Department of Chemistry & Physics
Erskine College
Due West, SC 29639

CSI-8650707
$8,429
Physics
30 months

"Optics Equipment for a Modern Physics Laboratory"

The teaching of optics will be combined with modern physics to prepare students for a technology that increasingly utilizes lasers and opto-electronics. This emphasis will be expanded in introductory courses, and a new, upper-level optics, light, and modern physics laboratory will be established. Experiments have been designed and successfully tested which combine laser light, modern physics, fiber optics, and computer interfacing. The department will purchase optical tables and lasers for making holographic and other interferometric measurements, optical fiber equipment for measuring the characteristics of light transmission, and equipment for computer interfacing. These experiments will be coordinated with experiments in modern physics for which little additional equipment is required. Simpler experiments using this equipment will be introduced into the introductory courses. The treatment of optics as a component of modern physics will increase the students' understanding of optical phenomena, especially those involving quantum mechanical concepts, and prepare them for a technology that uses electronics to interface lasers.

Lewis P. Stratton	CSI-8650497
Department of Biology	$46,000
Furman University	Biology
Greenville, SC 29613	30 months

"Modernization of Undergraduate Laboratories for Teaching Cellular/Molecular Biology and Biochemistry"

A major modernization of the equipment used to teach techniques of biochemical research and cellular/molecular biology is being undertaken by the Biology faculty at Furman University. The new equipment, including a modern spectrophotometer, a tabletop ultracentrifuge, high performance liquid chromatograph, oxygen electrode, state-of-the-art video densitometer and an ultra-pure water system, are the basis of a major revision in the way two core courses and several electives are being taught. In a five year period, about 250 undergraduates involved in an average of three to four courses per student will have extensive hands-on experience with the new equipment. The project is expected to result in much better informed students who are experienced in current laboratory technology. This will help to increase the number of students who enter graduate school with good laboratory skills.

In preparation for this project the Principal Investigator visited eight colleges with excellent reputations in teaching modern biology to undergraduates, in order to take maximal advantage of curricular improvements found there. As a result, this project incorporates many of the best current ideas in teaching the chemistry of biological systems.

Susan S. D'Amato	CSI-8650617
Department of Physics	$11,065
Furman University	Physics
Greenville, SC 29613	30 months

"Astronomical Equipment for Teaching and Observing"

The Physics Department at Furman will purchase five 8-inch and one 14-inch astronomical telescopes and other laboratory equipment for astronomy. The equipment is to serve three main purposes. The primary use is in the laboratory portion of an introductory astronomy course, a course which is taught at a level suitable for non-science majors. Some of the equipment is for indoor, on-campus use, whereas other items will be permanently installed in a modest observatory which is to be constructed by Furman at a mountain location a few miles north of Greenville, South Carolina. Second, the laboratories which are made possible through this project will provide valuable teaching experiences for the student assistants who will be involved. Finally, the new astronomy facilities will be made available, as are existing facilities, to local school, civic, church, and other groups for demonstrations, laboratory exercises, science projects, and observing sessions.

Edward Stampf, Jr.	CSI-8650537
Department of Chemistry	$26,387
Lander College	Chemistry
Greenwood, SC 29646	30 months

"NMR Instrumentation for Enhanced Undergraduate Chemistry Education"

The aim of this project is to improve undergraduate chemistry instruction at Lander College by acquisition of a 60-MHz nuclear magnetic resonance spectrometer. Laboratory courses that will be substantially improved by the incorporation of NMR capability are: introductory organic chemistry, inorganic chemistry, advanced organic chemistry, instrumental analysis, physical chemistry, and undergraduate chemistry research. With the new equipment, students will determine the structures of organic and inorganic compounds, many of which they synthesize themselves; perform quantitative analysis by NMR spectroscopy; determine equilibrium constants and dielectric constants; and investigate dynamic structure of molecules and chemical kinetics utilizing the variable temperature capability of the new instrumentation.

SOUTH DAKOTA

Presidential Awards for Excellence in Science and Mathematics Teaching

JoAnn Kothe
Mathematics
Hamlin High School
Hayti, SD 57241

Vijayalahshmi U. Ramakrishnan
Science
Rapid City Central High School
Rapid City, SD 57701

TENNESSEE

Presidential Awards for Excellence in Science and Mathematics Teaching

William M. Marking
Science
Raleigh Egypt High School
Memphis, TN 38127

Guy R. Mauldin
Mathematics
Science Hill High School
Johnson City, TN 37601

Fellowships

University of Tennessee at Knoxville Knoxville, TN 37996 Graduate Research Fellowships Support Grants	$16,350
Vanderbilt University Nashville, TN 37240 Graduate Research Fellowships Support Grants	$24,850

Patricia Brackin
Department of Mechanical Engineering
Christian Brothers College
Memphis, TN 38104

CSI-8650266
$14,494
Engineering
30 months

"Computer Aided Data Acquisition for the Mechanical Engineering Laboratory"

In order to meet the needs of laboratory courses in mechanical engineering by introducing new and sophisticated data acquisition methods, additional equipment has been acquired to complement the single data acquisition system previously available. The needs of three laboratory courses are now being met, and the laboratory experiences of the students are modernized and updated.

Katie Blackburn
East Tennessee State University
Johnson City, TN 37614

TPE-8554433
FY 86 $403,642
FY 87 $237,004
FY 88 $150,000
18 months

"MATHCAPS: Mathematics Consortium for Applications and Problem Solving Project"

This Leadership project will provide enhancement and professional development experiences for 150 exemplary mathematics teachers and up to 450 of their peers from the eastern Tennessee area. The overall goals of the multiyear project involve the updating and deepening of the participants' mathematical backgrounds and teaching methodology, the networking of the 540 participants, the conduct of frequent in-service helping and sharing sessions by the participants in their schools, the dissemination of the project materials and results, and the investigation of the modelistic approach within a carefully planned documentation, assessment, and evaluation effort. The MATHCAPS consortium of teachers and administrators of area schools, faculty, and administrators of colleges and universities, state-level educators and officials, scientists from a Federal research laboratory, and leaders from business and industry provides the strategic approach and financial base for institutionalizing the project.

In the first phase 30 middle school leader teachers will participate in an 8-week summer workshop, academic year meetings, and a 5-week summer workshop. The 150 peers will visit each summer workshop in order to build their project involvements. The mathematical education goals, contents and methods of the project have been conceptualized through advice from teachers, supervisors, mathematics teacher educators and researchers, and evaluation experts. Selection procedures are thorough, involving specific commitments of time and effort by leader teachers, peer teachers, and their principals. Treatments of major mathematical curricular areas will be provided through Visiting Scholars selected for their expertise from research and teaching experience. Frequent and meaningful academic year follow-up will be completed by project staff and all teachers. Significant materials will be produced, utilized and refined by the staff and the teachers, including videotape protocols of outstanding teaching and in-service modules for use by other leader-peer teams of teachers. All aspects of the model will be documented and assessed.

Alfred Wohlpart
Oak Ridge Associated University
Oak Ridge, TN 37831

TPE-8550505
FY 86 $158,900
FY 87 $141,000
FY 88 $ 90,000

"STRIVE: Science Teachers Research Involvement for Vital Education"

This project proposes a diversified plan to promote the professional development of teachers and to raise the quality of teaching. Twenty science and mathematics teachers from junior and senior high schools in Tennessee will participate each year. The project will coordinate with and complement the State of Tennessee's Career Ladder Program.

Participating teachers will engage in full-time energy-related research for eight weeks during the summer. The summer program will include weekly workshop sessions designed to provide the opportunity to develop resource materials and to explore creative ways to enrich the teaching of precollege science and mathematics.

To reinforce and encourage implementation of the most important aspects of the summer research participation workshop programs, the following complementary academic-year activities are planned:

Academic-Year Forums. Six forums will be held during the academic year. The forums will involve teachers who participate in the summer program, other science and mathematics teachers, and students.

Science Mentor Visitations Program. The research scientists who supervise the summer research participants will make visits and given presentations, assist students and teachers in laboratory experiments and research projects, and provide other help in their areas of expertise.

Scientist Lectures Program. Scientists from the U.S. Department of Energy Laboratories in Oak Ridge and from other facilities will visit area schools to present lectures and laboratory demonstrations.

Teacher Bootstrap Program. Teachers who participate in the summer program will serve as in-residence resource teachers and will be encouraged to make presentations and to demonstrate their knowledge and experience.

George M. Drew
University of Tennessee at Martin
Martin, TN 38238

TPE-8651464
FY 86 $123,121
FY 87 $129,440
FY 88 $136,080

"Program for the Enrichment of Science Instruction in Elementary Schools in Rural Tennessee"

The Center of Excellence for the Enrichment of Science and Mathematics Education at the University of Tennessee at Martin is charged with the responsibility of rendering service to public schools in mathematics and science education in the state of Tennessee. This project is designed to provide that service in elementary science in three Educational Service Centers in rural settings. Teams consisting of one primary teacher, one intermediate teacher, one principal, and one supervisor, all from the same school, will be formed. A major effort will be made to find minority participants and those interested in mainstreaming handicapped children. Three of these teams will be formed in each of the three Education Service Centers. These teams of exemplary educators will participate in an intensive eight-week summer session designed to increase competency in content and teaching strategies. Once trained, they will redesign the elementary science programs in their home schools. When that task is complete, the teams will move on to serve other institutions. These involvements will take the form of team members working in classrooms as trainers of teachers and with appropriate administrators. Support for the teaching teams during the academic year will be provided by "Level III" teachers who will serve as field supervisors, the science consultant for the State Department of Education, and the project staff.

TEXAS

Presidential Awards for Excellence in Science and Mathematics Teaching

Mary H. Christopher
Science
Southside High School
San Antonio, TX 78221

Peggy H. Huntley
Mathematics
John Foster Dulles High School
Sugar Land, TX 77478

Fellowships

Baylor College of Medicine Houston, TX 77030 Graduate Research Fellowships Support Grants	$32,700
Individual Award for Foreign Tenure Graduate Research Fellowship	$17,100
North Texas State University Denton, TX 76203 Graduate Research Fellowships Support Grant	$2,450
Rice University Houston, TX 77251 Graduate Research Fellowships Support Grants	$38,940
Texas A&M University College Station, TX 77843 Graduate Research Fellowships Support Grants	$84,710
Texas Christian University Fort Worth, TX 76129 Minority Graduate Research Fellowships Support Grants	$16,350
University of Houston - University Park Houston, TX 77004 Graduate Research Fellowships Support Grants	$32,700
University of Texas HSC - Dallas Dallas, TX 75235 Graduate Research Fellowships Support Grants	$16,350
University of Texas - Austin Austin, TX 78712 Graduate Research Fellowships Support Grants	$349,810

Glenn G. Davis	CSI-8650929
Department of Agriculture	$49,925
Abilene Christian University	Biology
Abiline, TX 79699	30 months

"Improvement of Undergraduate Laboratory Instruction in Soil-Plant Relationships"

The objective of this project is to improve instruction in the courses in which the root zone of the plant and the soil's interactions with the plant are studied. Students must measure plant growth, soil nutrient status, and the microclimate in order to understand the influence of the rhizosphere on plant growth. The goal of the project is to increase students' understanding of basic scientific principles involved in soil-plant relationships. This understanding will foster conservation of soil and contribute to efficiency in crop production. The equipment purchases through this award are typical of the sophisticated equipment used in soil and plant analysis laboratories that serve agricultural producers and research. Instruments for measuring nutrient content of the soil and for measuring light penetration through the plant canopy can be used successfully by undergraduate students, and are the types of equipment that soil and plant science graduates will use in their careers. Student enthusiasm for learning the principles of soil reactions and plant growth is greatly enhanced when instructional activity is carried out with "real world" equipment rather than with typical student laboratory equipment.

High precision instruments such as atomic absorption spectrophotometers, an infrared thermometer, leaf area meter, radiometer, autotitrator, and plant growth chambers will contribute directly to the objective of improving instruction in the courses involving soil-plant relations. For example, the atomic absorption spectrophotometer will detect elements in the soil; the growth chambers will permit the establishment and maintenance of two different climates for plant growth in a synchronous time frame; the infrared thermometer will measure plant temperature differences that indicate wilting stress in plant leaves before the leaf shows visible symptoms of wilting. This project brings a very significant infusion of scientific principles and insights to this agricultural program.

Joseph F. Pizzo
Lamar University
Department of Physics
Box 10046 Lamar Station
Beaumont, TX 77710

MDR-8550611
FY 86 $13,886
21 months

"A `Lending Library' of Physics Demonstrations"

Through this project, Lamar University will develop physics demonstrations to constitute a "lending library" for physics and physical science teachers in schools located near the University. Each packaged demonstration will reinforce a single concept in physics and will be used to supplement the usual lecture/demonstration format. Members of the Lamar University physics department will design, build and maintain the demonstrations, and expect to produce 20 packages during the period of this project.

The implementation of the project will be carried out in the frame work of four components. (1) the design and construction of self-contained demonstration packages; (2) the maintenance of these single concept demonstration packages at Lamar University, to be checked out by area precollege teachers; (3) the presentation of workshops on the effective use of the demonstration; (4) follow-up visits to the schools where the demonstrations are being used.

This project is developing an innovative approach to enhancing instruction in phyics, an approach with good potential for serving as a model for other institutions and disciplines.

Comer O. Patterson
Texas A&M University
College Station, TX 77843

TPE-8552359
$189,443
Biology
36 months

"Computer Workshops for High School Biology Teachers"

This project funds a series of workshops designed to show high school biology teachers and administrators how to use computer technology most effectively in biology. The workshops will provide an opportunity for 150 teachers from the state of Texas to attend five-day workshops emphasizing hands-on computer experience and the associated wet labs.

Using courseware modules developed with funding from previous NSF grants, the program will allow participants to study plant growth and development, cardiopulmonary physiology, foraging patterns and energetics, the trophic-dynamic features of a balanced ecosystem, hormonal control of the menstrual cycle, and patterns of competition among algae in a lake. A set of wet lab exercises to accompany the computer exercises will be conducted.

The workshops will be held in Houston in the Fall of 1986 and on the campus of Texas A&M University in the Summers of 1987 and 1988. Three-person teams at each of 10 high schools will be invited to attend each workshop. Each team will consist of teachers and administrators.

During the Academic Year, one-day workshops will be held in the Fall and Spring. In addition, visits will be made to high schools to assist in the development of computer consciousness among teachers and students.

Melvin C. Schroeder Texas A&M University College Station, TX 77843	TPE-8550904 $313,856 Earth 36 months

"Texas Regional Teacher Development in Earth Science"

The purpose of this project is to improve the earth science background of middle school science teachers. Thirty teachers from the state of Texas will participate each year. The project will place special emphasis on recruiting minority and physically-handicapped participants.

During the summer, the project includes three weeks of instruction on campus and a 10-day field trip. The on-campus phase includes lectures by guest lecturers from Texas A&M University and afternoon laboratories. This will be followed by a 10-day field trip to Central and West Texas.

The academic year following the summer workshop will have 3 two-day reinforcement meetings and classroom visitations by the project staff. In June following the academic year, a day will be devoted to implementation-dissemination activities. This will be followed by a 10-day field trip to the Southern Oklahoma area, the Central Mineral Region of Texas, and the Coastal Shoreline area. The project is designed to repeat the sequence twice starting with the summer phase.

Gerald Skoog Texas Tech University Lubbock, TX 79409	TPE-8650179 $199,421 14 months

"Science Workshops for Elementary Teachers and Principals"

This project will increase the knowledge of science of K-6 teachers, improve the teachers' knowledge of the methodology associated with teaching science, explore recent science-related societal issues, and improve the ability to teach science to exceptional students (gifted and talented, bilingual, and physically disabled). The activities for elementary school teachers will be accompanied by in-service activities for principals, directed toward a quality K-6 science program and the role of the principal in developing and implementing the program.

Three different, but related, programs will be offered. Fifty elementary school teachers will be selected for two of the programs. Twenty-five from within commuting distance of Lubbock will attend sessions on the Texas Tech University campus one night a week during the 1986-87 academic year and one six-week summer session in 1987. The other 25 participants, living beyond commuting distance, will attend corresponding sessions at Lamesa.

Principals will participate in the third program consisting of two all-day workshops conducted in October and November of 1986. The objectives and description of an in-service program for teachers, the use of assessment instruments to evaluate K-6 science programs, and the role of principals as leaders in curriculum development will be presented.

All sessions will include special programs and techniques to assist project participants in helping their colleagues in planning and teaching science. Selected teachers will meet with principals to formulate staff development strategies and plans. All activities will be based on the assumption that science in grades K-6 can be taught without elaborate equipment and supplies.

Michael P. Doyle Department of Chemistry Trinity University San Antonio, TX 78284	CSI-8650460 $25,700 Chemistry 30 months

"NMR Spectral Applications in Chemistry and Biochemistry"

The Department of Chemistry at Trinity University will fully integrate nuclear magnetic resonance spectroscopy into its undergraduate curriculum using applications that demonstrate the enormous power and versatility of this spectroscopic methodology for the examination of chemical structure and dynamics. Virtually all students who have the potential to employ NMR methodologies in their eventual careers will be exposed to multiple uses of this essential technology. Development of this program will be achieved through the purchase of a 60-MHz nuclear magnetic resonance spectrometer for observation of proton and phosphorus-31 nuclei. This spectrometer will be employed for spectral observations of organic and organophosphorus compounds, for determination of the structure and dynamics of inorganic compounds having phosphorus ligands, and for investigations of biochemical processes by phosphorus-31 observation. Uses of this instrument will bring together major research developments which are dependent on NMR spectroscopy, particularly in biochemistry and inorganic chemistry, and relevant applications of this spectroscopy for inorganic chemistry and biochemistry in the undergraduate laboratory.

John L. Creswell Houston University Houston, TX 77004	TPE-8550514 FY 86 $126,384 FY 87 $150,000 FY 88 $ 15,000 Mathematics

"A Project to Train Prospective Master Teachers in Middle School Mathematics Using a Problem-Solving Format"

This Leadership Activities project will provide enhancement and professional development experiences for 30 exemplary middle school mathematics teachers from the Houston, Texas area. The overall goals of the multiyear project involve the updating and deepening of the participants' mathematical backgrounds and teaching methodology, the networking of the participants, the conduct of in-service workshops by the participants in their home schools, the dissemination of the project materials and results to nearby school systems, and the investigation of the modelistic approach within a carefully planned documentation, assessment and evaluation effort.

Working under the assumption that leadership potential involves special characteristics, the project team and Advisory Board, which consists of representatives for 10 cooperating school districts, will engage in a thorough selection process. Documentation of the individual participant's entering characteristics and the competencies developed through project activities will contribute to the overall project evaluation.

Participants will complete four special mathematics courses designed to encompass the CUPM recommendations for junior high school teachers, earning 12 graduate semester credits for the University of Houston. They will study with university faculty chosen for their excellence in teaching teachers. Mathematics studies will include ideas from mathematical problem solving, probability and statistics, history of mathematics, abstract algebra, number theory, and geometry. Participants will also complete 15 graduate semester hours of studies related to the pedagogy of middle school mathematics. Uses of microcomputers, diagnosis and remediation, and problem-solving strategies will be featured. During the in-service workshops which the participants will design and conduct, project staff will be available for consultation and support. Participants will be visited, observed, and videotaped in their classrooms and in their workshops with their peers. Careful documentation and analysis of these observations and recordings will provide a significant basis for a detailed project evaluation.

Thomas R. Koballa, Jr.
University of Texas
Austin, TX 78712

TPE-8651477
$67,363
Life Science
12 months

"Precollege Teacher Development in Science Program for Middle School Life Science Teachers"

This is a well-designed program that will provide enhancement and professional development experiences for 30 middle school science teachers from the Central Texas area at the University of Texas at Austin. The goals of the program are to improve the biological content knowledge of the participants; provide them experience with developments in education technology, teaching methods, and experience with developments in education technology, teaching methods, and research in teaching and learning; and maintain communication and cooperation between science educators and scientists at the University and the teachers.

There will be special sessions entitled, "Middle School Kids Meet the Scientist." These sessions will be conducted in life science classrooms during the fall by scientists from the University of Texas at Austin. This is an especially attractive feature for it will give students an opportunity to interact and communicate with scientists.

UTAH

Presidential Awards for Excellence in Science and Mathematics Teaching

Charles R. Miller
Mathematics
Olympus High School
Salt Lake City, UT 84124

LaMont Jensen
Science
Clearfield High School
Clearfield, UT 84015

Fellowships

Brigham Young University Provo, UT 84602 Graduate Research Fellowships Support Grants	$16,350
Univeristy of Utah Salt Lake City, UT 84112 Graduate Research Fellowships Support Grants	$98,250
Utah State University Logan, UT 84322 Graduate Research Fellowships Support Grants	$16,350

Richard R. Tolman
Brigham Young University
Provo, UT 84602

TPE-8550478
$80,058
Biology
12 months

"A Science Content Update Course for Life Science Teachers in the Secondary Schools of the BYU-Local School Dsitrict Partnership"

This project will improve the subject matter and teaching background of high school biology teachers.

Beginning with the Winter Semester, 1986, and again during the Fall Semester, 1986, In-Service Workshops will be conducted by Brigham Young faculty members at two locations each semester.

Thirty teachers will participate each semester at each site. Fourteen topics chosen for presentation have been selected by teachers in the school districts. Each period will be devoted to lecture, laboratory work, and discussion of how the materials can be used in the classroom.

Von Del Chamberlain
Hansen Planetarium
15 S. State Street
Salt Lake city, UT 84111

MDR-8550952
FY 86 $ 67,882
FY 87 $ 28,884

"A Nationally Distributed Planetarium Star Program and Chart on Galaxies"

The Hansen Planetarium, a leader in the planetarium field, will develop, produce and distribute a 45-minute planetarium program about galaxies, the fundamental building blocks of the universe. Major efforts to translate data about galaxies for the general public have been few and planetaria are an extremely effective medium to pursue this effort.

Based on the Hansen Planetarium's experience in distributing 11 star programs, including the very successful and effective program "The Universe of Dr. Einstein" which was shown in over 666 planetaria, this program is expected to be used by approximately 300 planetaria reaching several million people. The program will be written by Timothy Ferris, author of the best-seller Galaxies. The Hansen Planetarium has recruited a highly talented and respected group of astronomers who will serve as scientific advisors to the project. A Science teacher will also serve on the advisory committee to ensure that development of the teacher's guide is written at the appropriate grade level.

To supplement the star program, the Hansen Planetarium will research, design, produce and market a teacher's guide and a full-color educational chart on galaxies.

Walter L. Saunders	TPE-8550548
Utah State University	$278,178
Logan, UT 84322	36 months

"Implementing the Learning Cycle Approach to Instruction in High Schools: Teacher Development and Materials Development"

This project will bring about changes in instructional practices in secondary science classrooms in the area surrounding Utah State University. Teachers will be supplied with materials and taught the techniques necessary to implement the Learning Cycle approach to instruction.

The program will include three phases. Phase I will consist of the preparation of appropriate teaching materials and will be conducted during the 1985-86 academic year.

Phase II will be a three-week summer session, for 30 participants who will receive instruction in cognitive psychology with emphasis on the Learning Cycle Model. Activities during the following academic year will apply the principals and activities in the classroom environment. Videotaping will allow the participants and staff to document changes which occur in the classroom.

Phase III will consist of a summer workshop for ten of the participants, to revise the previous program. During the following academic year, the revised programs will be used in the classroom and reevaluated.

James B. Olsen	MDR-8651554
Eric G. Hansen	$339,063
Tests and Measurements	18 months
WICAT Education Institute, Inc.	
931 East 300 North	
Provo, UT 84601	

"Interactive Video Technologies for Biology Assessment and Instruction"

This project will combine existing technologies in an attempt to make the testing of students' achievement in biology and the life sciences precise and efficient. The technologies involved include microcomputer, interactive videodisc, CD-ROM containing data bases of questions and instructional materials, graphics, shared disks and printers, and adaptive testing. The tools developed under the project are expected to ease the administration and bookkeeping burdens associated with the creation, administration and scoring of high school science assessment and diagnostic tests and to provide test results with prescriptions to text-based curricula for remediation and enrichment. Diagnostic tests with automated routing to high quality videodisc-based instruction will also be provided. The prototype to be developed and tested focuses on biology and life sciences in grade 7-12. Once the concept is proven, WICAT is in a position to readily extend the system to high school courses in physics, chemistry and general science.

The main objective of this project is to test the validity of the adaptive testing approach in science to determine if it can yield time improvements of 50% to 70% as obtained in mathematics.

The independent evaluation is expected to show, in addition to decreased testing time, improved teacher-made tests and improved student attitudes toward science. Results will be disseminated through publications and at regional and national conferences of science teachers and school board members.

Robert R. Beishline	CSI-8650790
Department of Chemistry	$29,133
Weber State College	Chemistry
Ogden, UT 84408	30 months

"Upgrading the Mass Spectrometry Laboratory Program for Undergraduate Students in Chemistry"

This project will replace an obsolete mass spectrometer with a computer-controlled gas chromatograph/mass selective detector for use by undergraduate students in organic chemistry, chemical instrumentation, applied analyses, and spectrometric and separation methods. The mass selective detector, associated computer hardware and software acquired for this project will be interfaced with a gas chromatograph recently donated to the chemistry department, thus providing GC/MS capability. Principles and techniques to be taught in upgraded or new experiments include operation of a computer-controlled GC/MS; identification of a sample compound from the relative magnitudes of the P, P+1, and P+2 peaks; separation and identification of compounds in complex mixtures; and identification of compounds by interpretation of fragmentation patterns.

Herbert K. Brunkhorst	TPE-8651499
Weber State College	$231,603
Ogden, UT 84408	Life/Physical/Earth
	24 months

"Science Institutes for Elementary Teachers"

Weber State College is offering a series of three intensive two-week summer institutes and academic year seminars for 60 elementary teachers each year from intermountain northern Utah. The program will provide broad, comprehensive instruction and activities in life, physical and earth sciences as they apply to the state of Utah's new guidelines for elementary school science. Each participant will have to make a six-week commitment to insure that all three workshops will be completed.

One-on-one follow-up visits by staff to each participant's classroom will aid in implementing changes in teaching/learning strategies. Academic year seminars will provide the opportunity for discussion, support, and evaluation. Each participant will develop his/her own resource guide and construct inexpensive equipment for use in the classroom. A unique component of this project is the involvement of preservice elementary school majors who will be interning with participants during the summer program.

VERMONT

Presidential Awards for Excellence in Science and Mathematics Teaching

Lawrence O'Keefe
Science
Edmunds Middle School
Burlington, VT 05401

John S. Pluta
Mathematics
Mill River Union High School
North Clarendon, VT 05759

Fellowships

University of Vermont Burlington, VT 05405 Graduate Research Fellowships Support Grants	$7,070

Bruce F. Berryman
Department of Meteorology
Lyndon State College
Lyndonville, VT 05851

CSI-8650783
$7,990
Earth Sciences
30 months

"Expanding Meteorological Observational Capabilities"

The gathering of quality local weather data for undergraduate classroom and student project work has been enhanced by the acquisition of additional new equipment including surface and upper-air wind observing equipment, vertical temperature profile observing equipment, and atmospheric long-wave radiation emission observing equipment. Undergraduate science education is improved through demonstrations and direct experience with field work, thus affording a better understanding of atmospheric processes.

Stephen F. Sontum
Department of Chemistry
Middlebury College
Middlebury, VT 05753

CSI-8650910
$15,353
Inter & Multidiscipl.
30 months

"A Cooperative Multidepartmental Computer Facility for Undergraduate Science Laboratories"

The computer data collection systems procured through this project are being used to introduce Middlebury College undergraduate science students to an important area of contemporary experimental science previously underrepresented in the school's biology, chemistry, geology and physics curricula. These systems permit the teaching of real-time computer techniques, an area of analytical science whose coverage in earlier courses was predominantly descriptive. Students in senior thesis programs and instrumental analysis courses gain experience with state-of-the-art computing equipment similar to that which they will encounter in graduate school or industry.

In both the course-related studies and independent senior projects, this equipment enhances students' problem solving skills, and introduces them to contemporary computer techniques. A pilot project conducted by the college with its own funds already has validated the approach, and has enabled the development of materials and methods.

William G. Howland	CSI-8650948
Northern Studies Program	$5,910
Middlebury College	Earth Sciences
Middlebury, VT 05753	30 months

"Instruments for Undergraduate Instruction in Snow and Ice Climatology"

Field instruments, including low temperature anemometers, a pyronometer to measure net radiation loading at the ground or snow surface, a 20-channel data logging device suitable for remote low temperature use, and associated computing equipment are being used to improve undergraduate instruction in the Northern Studies curriculum. Field data concerning snow, ice and the lower atmosphere is being recorded and analyzed. In laboratory and field locations, the measurement and analysis of the micro-climatology of snow and ice is being done by students, for the first time in a new sophomore course, and with substantially increased scale and sophistication in the mandatory Senior Thesis program. The equipment is particularly well suited to the study of nearby snow and rime-ice environments at elevations above treeline in the Green Mountains of Vermont (an ongoing study at Middlebury College).

David S. Westerman	CSI-8650939
Department of Earth Science	$19,803
Norwich University	Earth Sciences
Northfield, VT 05663	30 months

"Norwich University Geophysical Methods Project"

The acquisition of equipment for gravity surveying, magnetic surveying, electromagnetic surveying and seismic surveying has significantly improved undergraduate laboratory experiences in geophysics at Norwich University. These equipment systems take advantage of naturally occurring variations in density (gravity studies), conductivity (electromagnetic studies), and velocity of sound propagation (seismic studies). Gravity studies of near-surface density contrasts as well as regional changes in gradients are carried out. Buried geologic units and their contacts are mapped using the magnetic and electromagnetic equipment. Seismic studies focus primarily on refraction methods and mapping glacial deposits. The addition of this equipment has opened "windows" for students to see relationships inside the earth.

VIRGINIA

Presidential Awards for Excellence in Science and Mathematics Teaching

Lorraine H. Kilpatrick
Mathematics
Providence Middle School
Richmond, VA 23224

Barbara J. Whittier
Science
Wakefield High School
Arlington, VA 22206

Fellowships

Individual Award for Foreign Tenure Graduate Research Fellowship	$17,100
University of Virginia Charlottesville, VA 22903 Graduate Research Fellowships Support Grants	$119,770
Virginia Polytechnic Institute Blacksburg, VA 24061 Graduate Research Fellowships Support Grants	$32,400

Jean L. Hatten	CSI-8650705
Department of Psychology	$15,603
Averett College	Psychology
Danville, VA 24541	30 months

"Computer-Interfaced Instrumentation for Undergraduate Coursework and Research Apprenticeships in Psychology"

Through the purchase of Macintosh microprocessors, interfaces and software, psychology undergraduates at Averett College are able to learn research skills using up-to-date instrumentation and data management methods. A sequence of three lab courses requires students to take increasing responsibility for conducting psychological research; and an increased number of students are enjoying improvements in the quality and variety of research projects available to them in the labs. Student research projects also are being automated using Macintosh microprocessors, along with the software needed to control ten research stations and to support data management, statistical analysis, and graphics functions. Test chambers using either rats or pigeons as subjects have been procured, further increasing the range of observations that can be made.

Jack A. Gerlovich	TPE-8550886
Council of State Science Supervisors	$77,283
Richmond, VA 23216	

"A National Telecommunications/Computer Network for Science Education"

The Council of State Science Supervisors will develop a science education database and a telecommunications (computer/telephone) network among the 50 state Departments of Education, the National Science Teachers Association and its affiliates, the National Science Resource Center/National Academy of Sciences, and existing intrastate systems. The computers and peripherals will be donated to the project by IBM. The network will facilitate close working relationships among national, state, and local educational agencies and serve private organizations who wish to use it.

The database to be developed and disseminated will include:

- abstracts of curriculum guides for all disciplines in science available from all 50 states,
- common topics taught in science programs in the states, and valid and reliable assessment items,
- a science educator's employment listing,
- current certification standards,
- calendars of important activity dates of major science education organizations,
- position papers concerning effective science teaching,
- general science education information of use to teachers,
- contemporary legislative and court activities which will impact science education, and
- messages and surveys.

Information distributed on the primary network will reach teachers in each state through intrastate computer networks or existing intrastate newsletters. Organizations dedicated to improving science education will be contacted and encouraged to link to the network directly, or indirectly through their state science supervisor.

Dianne Robinson Hampton University Hampton, VA 23668	TPE-8652086 FY 86 $ 126,846 FY 87 $ 133,039 FY 88 $1,321,791 FY 89 $ 107,920 FY 90 $ 96,545 Biology/Chemistry/ Physics/Computer

"Model Program for the Preparation of Middle School Science Teachers"

In this project Hampton University will develop a five-year model program for the preparation of middle school science teachers. This model program will involve the development of one new mathematics course, three new science courses, and the modification of six existing science courses in the first three years. Years four and five will focus on course evaluation and revision, selection of mentor teachers, and development of field placement and student teacher experiences. The science content requirements being proposed satisfy National Science Teachers Association recommendations for middle school teachers.

In an attempt to recruit minority students into teaching, Hampton University, which has a predominately black student body, will work closely with high school science teachers and will mount a powerful recruitment campaign within its student body. It is projected that within five years more than 108 students will be enrolled in the middle school science teaching program.

This project represents a cooperative effort among the academic departments of science education, biology, chemistry, physics, and computer science. Faculty from each department will be involved in course development and evaluation. Public schools personnel will also be involved as members of an advisory committee, as mentor teachers, and in the planning and implementation of in-school preservice teaching experiences.

Benjamin A. DeGraff Department of Chemistry James Madison University Harrisonburg, VA 22801	CSI-8650371 $13,611 Chemistry 30 months

"Applications of Lasers in Chemistry"

The aim of this project is to introduce upper-level undergraduate chemistry students at James Madison University to the uses of lasers in various aspects of chemistry. Courses in instrumental analysis, physical chemistry, and biochemistry, and undergraduate research opportunities will be enhanced through this project. Included are new experiments involving Raman spectroscopy, regular, polarized, and phase sensitive emission spectroscopy, multiple photon effects, laser vaporization, and thermal lensing. These techniques will be incorporated through the acquisition of two lasers, Nd:YAG and He/Cd units, plus a suitable selection of accessories. Lasers have had a significant impact on the practice of modern chemistry. This project will expose students to many of the important chemical applications of lasers.

Jacob Becher Old Dominion University Norfolk, VA 23508	TPE-8651452 $99,682 Physical Sciences 14 months

"Regional Institute for Teachers of Science in Grades 4, 5, and 6 in Tidewater Virginia"

The purpose of this proposal is to improve the teaching of physical science for 30 elementary school teachers of grades 4, 5, and 6 in the Tidewater area of Virginia. The teachers will be selected in pairs from six-cooperating local school districts to participate in an intensive six-week workshop at Old Dominion University with monthly follow-up seminars during the academic year. Project staff will visit the participants' schools on a regular basis to assess the impact of the program on the students in their classrooms and to consult with science supervisors and principals.

Gloria Bohan Omega World Travel Falls Church, VA 22041	$150,000

"Travel and Administrative Services in Support of International Science Activities Sponsored By the National Science Foundation"

Robert Sullivan Peninsula Nature & Science Center 524 J. Clyde Morris Bvld. Newport News, VA 23601	MDR-8550949 FY 86 $250,000 12 months

"Virginia Living Museum"

The Peninsula Nature and Science Center (PNSC) in Newport News, Virginia, has been serving the informal science education needs of the Virginia Peninsula region for the past 17 years. As a "living museum" it is a combination of a natural history museum, zoological and botanical garden, nature center, aquaria and science center. By means of living plants and animals, the PNSC plans to develop a series of comprehensive indoor and outdoor exhibitions explaining, interpreting and providing participatory experiences for visitors about the Atlantic Coastal Plain area.

The Commonwealth of Virginia has allocated a million dollars toward construction of the proposed facility expansion and the PNSC has raised an additional $502,560 for facilities and exhibits. The National Science Foundation grant will provide funds for the indoor exhibits which include: "A Walk in the Past," covering the geology of the area, a time line wall with touch specimens, the earth's formation and the Dismal Swamp; "How Life Survives," covering food gathering, protection, shelter and living space and propagation along with a microscope station; and the "World of Darkness," where activities of nocturnal animals can be observed.

The PNSC has an extensive teaching program with the elementary schools in the region. They plan to expand these activities and, additionally, expect to have a statewide impact since they will be a prime informal science education resource in the state. They also have the potential of becoming a model for the 1600 nature and science centers in the U.S.

Benjamin P. Huddle	CSI-8650438
Department of Chemistry	$13,432
Roanoke College	Chemistry
Salem, VA 24153	30 months

"Improvement of UV-Visible Spectroscopy at Roanoke College"

This project will enhance significantly the undergraduate chemistry curriculum at Roanoke College by incorporating state-of-the-art UV-visible spectroscopy into laboratory courses in physical chemistry, instrumental analysis, and biochemistry. The computer-controlled UV-visible spectrophotometer acquired for this project affords capabilities not previously available to students at Roanoke College: determining absorbance as a function of time, measuring spectra at various temperatures, and obtaining spectra with very high resolution. Current experiments will be improved substantially, and new experiments will be added to the curriculum. Examples include a study of a Co (II) equilibrium system, determination of thermodynamic functions from spectroscopic data, and investigations of enzyme kinetics. The project will give students at Roanoke College experience with modern technology in UV-visible spectroscopy.

W. John Hayden	CSI-8650724
Department of Biology	$14,559
University of Richmond	Biology
Richmond, VA 23173	30 months

"Phase Microscopes for Instruction in Structural Botany"

The instruments to be provided through this project, Nikon Alphaphot-KT microscopes with phase contrast optics, will permit great flexibility in illumination techniques and usable magnification powers. Phase microscopy increases contrast in materials with little natural contrast and is useful in showing cytoplasmic organelles in living or fresh-unstained tissues. These microscopes also offer darkfield illumination, a technique especially valuable in the study of single-celled organisms. Polarized light microscopy will permit analysis of the stratification of cell walls and the location of crystals present in tissues. Further, the increased clarity, brightness, and resolution of these microscopes will enhance ordinary brightfield microscopy in the instruction of plant morphology.

This improvement in optical microscopy, through the updating of scientific instrumentation, is expected to have an immediate impact on the development of structural botany classes at the University of Richmond, and to provide long-term curricular enhancement that will enable students to be better prepared to enter graduate or professional schools. This project addresses a subspecialty of biology that has suffered from neglect in undergraduate education.

Philip B. Peters	CSI-8650720
Department of Physics	$11,538
Virginia Military Institute	Physics
Lexington, VA 24450	30 months

"Computer Interfacing - 1985 and Beyond"

The project will allow the revision of an established interdisciplinary course in computer interfacing to reflect current practice in scientific and engineering applications. While the course will continue to stress concepts fundamental to computer interfacing, increased emphasis will be given to the flow of information between the computer and devices responsible for sensing and controlling experiments or processes. The use of prepackaged hardware and software components to acquire, process and display data will be introduced after presentation of the basic concepts. The student projects requiring the design and implementation of an application of interfacing will be continued and expanded to make use of the equipment. Ten small portable Tandy model 200 microcomputers will form the heart of the proposed laboratory workstations. A single IBM PC-XT and large hard disk will serve as a host to the individual workstations. This system will have enhanced capabilities for processing, storing, and displaying data acquired from each of the smaller microcomputers. The requested equipment will be used in other physics, engineering and chemistry courses including senior research in the spring semester when it is not used in the interfacing course.

	SPA-8651512
Edgar L. Edwards, Jr.	$74,469
Virginia State Department of Education	Mathematics
Richmond, VA	6 months

"A Model for Statewide Mathematics Assessment in Virginia Based on the Second International Mathematics Study"

The Department of Education of the Commonwealth of Virginia has proposed to replicate the methodology and findings of the Second International Mathematics Study (SIMS) by designing and conducting a comprehensive survey of the eighth and twelfth grade mathematics programs for the Commonwealth of Virginia and for two selected school divisions within the Commonwealth. The findings will be used to identify strengths and weaknesses of the mathematics curriculum at the state and division levels, in light of SIMS data available on the national and international levels. The resulting information will be taken into account in curriculum reform activities in the Commonwealth. This application of the SIMS methodology is expected to provide a powerful model for assessing mathematics programs that will be used elsewhere within Virginia and could have utility in other states and regions of the United States, as well. The main objective of the study is to develop a model for program assessment and evaluation at the state and local levels in order to provide detailed, high quality data for curriculum supervisors, classroom teachers and school administrators in assessing their current curriculum and in identifying new directions for improvement.

The project will be carried out in three phases:
(i) Curriculum Analysis Phase: An analysis of the curriculum will be conducted for the two target populations: (1) all eighth grade students and (2) those students in twelfth grade college preparatory mathematics classes. This curricular information will be used to assess the adequacy of the item pool of the Second International Mathematics Study for program evaluation in Virginia. If necessary, the item pool will be augmented to adequately reflect major content areas in the Virginia curriculum.

(ii) Testing Phase: Probability samples of classes will be drawn from the entire state for each of the two target populations. Concurrently, two school divisions will be targeted for study. The students will be tested (attitudes and achievement) at the end of the 1986-87 school year.
Data will be obtained from teachers on "opportunity-to-learn," that is, the extent to which the subject matter on the tests has been taught to the students being tested, and on classroom processes used for selected topics in the curriculum.
(iii) Analysis and Reporting Phase: Data will be analyzed and reports will be generated for use of classroom teachers and supervisors and personnel at the Virginia Department of Education. Reports will also be prepared that will be of interest to professionals at corresponding levels of responsibility outside of the Commonwealth.

VIRGIN ISLANDS

Meledath Govindan	CSI-8650980
Department of Chemistry	$22,369
College of the Virgin Islands	Chemistry
St. Thomas, VI 00802	30 months

"Nuclear Magnetic Resonance Spectrometer for Undergraduate Chemistry Instruction"

This project will incorporate a 60-MHz nuclear magnetic resonance spectrometer into upgraded undergraduate chemistry instruction at the College of the Virgin Islands. No other NMR is available in the region, and geographic isolation precludes instrument-sharing with universities or research centers on the mainland. Availability of the NMR will enhance the educational experience of students in organic, analytical, inorganic, and physical chemistry laboratory courses. In addition, the instrument will be used by undergraduate students for research projects. NMR spectrometry experiments to be integrated into the chemistry curriculum are based on experiments published recently in the chemical literature. Providing hands-on experience with NMR spectrometry will make a significant contribution to the chemistry education of undergraduate students at this historically Black college.

WASHINGTON

Presidential Awards for Excellence in Science and Mathematics Teaching

David C. Tucker
Science
Mt. Baker Junior/Senior High School
Deming, WA 98244

Frederick P. Wright
Mathematics
Lakeside School
Seattle, WA 98125

Fellowships

University of Washington Seattle, WA 98195 Graduate Research Fellowships Support Grants	$333,190
Washington State University Pullman, WA 99164 Graduate Research Fellowships Support Grants	$65,400

Carl W. Steidley	CSI-8650661
Department of Computer Science	$50,000
Central Washington University	Computer Science
Ellensburg, WA 98926	30 months

"A Computer Hardware Sequence for Computer Science Majors"

The Department of Computer Science will purchase microprocessor interface systems, logic designers, robotics systems, and associated hardware to establish a sequence in computer hardware. A digital laboratory, built around the microprocessor/microcomputer development system, will be established. This laboratory will serve as the practicum center for a sequence of three courses, which are being designed currently: Logic Design, Operating Systems and Computer Architecture, and Microprocessor-Based Systems. Computer science students who graduate from the program will have experience in digital logic, computer interfacing, data acquisition, and computer control. Thus they will be better prepared for industrial positions in computer science or for graduate school.

Donald R. Lightfoot	CSI-8650796
Department of Biology & Chemistry	$44,528
Eastern Washington University	Biology
Cheney, WA 99004	30 months

"Equipping the Undergraduate Biotechnology Program"

This project is designed to upgrade significantly the scientific equipment available for teaching five laboratories in Eastern Washington University's new Biotechnology Program -- Hybridomas and Monoclonal Antibodies, Plant Tissue Culture and Differentiation, Recombinant DNA, Biochemistry and Fermentation, and Metabolism. The award will effectively put the 1-1/2-year-old experimental program onto sound footing as a permanent offering of the department. The requested equipment includes state-of-the-art microscopes, ultracentrifuges, an enzyme-linked immunoassay reader, fermentation apparatus, incubator, and a biohazard safety cabinet. During its first eighteen months, the program has attracted 20 majors and 178 other students. While still on a trial footing, it has placed more than a dozen graduates into positions in the local bio-technology industry.

John O. Aikin	CSI-8651014
Department of Computer Science	$50,000
Evergreen State College	Computer Science
Olympia, WA 98505	30 months

"Computer Science Teaching Laboratory"

The Evergreen State College will establish a programming laboratory and prepare teaching materials specifically designed for the teaching of computer science. The laboratory facility will consist of thirty-two personal computers/terminals connected to the College's central Data General computer, a video projection terminal for group work, and a line printer for program listings and handouts. Faculty have developed programming and problem solving workshops in computer science, mathematics, and software engineering which will make effective use of this terminal facility. In laboratory sessions analogous to those used in the physical sciences and under the direction of faculty, students will perform experiments designed to reveal the fundamental concepts of the discipline and to instill in them the methodology necessary for the successful practitioner. The laboratory will also be used for extensive student software development projects as part of Evergreen's year-long project programs in computer science. With this laboratory facility, students will learn problem solving methodology faster, and with a higher retention rate, than is now the case. Students will also gain valuable experience working in programming teams.

F. H. Mitchell
Department of Electrical Engineering
Gonzaga University
Spokane, WA 99258

CSI-8650436
$50,000
Engineering
30 months

"Hybrid Microelectronics Laboratory Equipment"

Over the past two years, the Department of Electrical Engineering at Gonzaga University has established a program in thick film hybrid microelectronics. The curriculum has been modified to provide an adequate basis for the program, and a laboratory has been developed. The Department has developed a three-phased plan to upgrade the existing laboratory so that students may gain practical experience in high level computer-aided manufacturing (CAM) of hybrid microcircuits. The current phase, implemented through this project, allows the incorporation of an infrared zone furnace and an automated hybrid assembly unit. These pieces of equipment will enhance the educational, research, and development capabilities of the institution's existing hybrid microelectronics program.

Laurence D. Huestis
Department of Chemistry
Pacific Lutheran University
Tacoma, WA 98447

CSI-8650770
$28,469
Chemistry
30 months

"Improving Chemistry Instruction with the Integrated Application of Gas Chromatography, Mass Spectrometry, and Infrared Spectrophotometry"

This project will enhance significantly the chemistry education of undergraduate students at Pacific Lutheran University by providing hands-on experience with analytical techniques used in modern chemistry. Acquisition of a computer-controlled gas chromatograph/mass selective detector will enable students in organic chemistry, analytical chemistry, instrumental analysis, and undergraduate research to use the powerful combination technique of gas chromatography/mass spectrometry for separation and identification of components of complex mixtures.

The gas chromatograph acquired for this project will also be interfaced with a Fourier transform infrared spectrophotometer recently purchased by the Chemistry Department. The availability of GC/MS and GC/FTIR capability will provide gas chromatographic, mass spectral, and infrared data for the same sample, and will allow students to investigate more complex mixtures of compounds and "real world" problems.

Richard J. Spillman
Department of Math & Computer Science
Pacific Lutheran University
Tacoma, WA 98447

CSI-8650680
$33,810
Computer Science
30 months

"Development of an Artificial Intelligence Track in Computer Science"

The Department of Mathematics and Computer Science at Pacific Lutheran University will establish an artificial intelligence (AI) laboratory as part of a new AI track in the computer science major. The laboratory will be equipped with four Tektronix 4405 AI development systems. The laboratory will be used in three courses: Artificial Intelligence, Pattern Recognition, and Expert Systems. The AI sequence will provide students with a strong background in the rapidly growing specialty of AI as part of a broader computer science major.

John E. Meany
Department of Chemistry
Seattle University
Seattle, WA 98122

CSI-8650548
$10,223
Chemistry
30 months

"An Ultraviolet/Visible Computing Spectrophotometer for Laboratory Courses and Undergraduate Research"

The objective of this project is to implement curriculum changes in analytical and biochemistry laboratory courses and to upgrade the research opportunities for undergraduate students at Seattle University. In these laboratory courses, a modern, temperature-controlled computing UV/visible spectrophotometer system will allow students to learn the operation and applications of state-of-the-art scientific equipment, will broaden the scope of laboratory projects, and will provide the accuracy and precision needed for students' research. In quantitative analysis, instrumental analysis, biochemistry, and undergraduate research, students will determine the concentrations of several analytes in a mixture, investigate reaction kinetics, and study absorbance in the gas phase. Incorporating this instrument into the laboratories will increase both the quality of the students' education and the number of students who gain experience in modern UV/visible spectrophotometry.

Norman R. Anderson
University of Puget Sound
Tacoma, WA 98416

TPE-8650134
FY 86 $ 64,773
FY 87 $117,239

"Elementary Education - Competence/Leadership"

This project will upgrade the content knowledge and teaching skills in the physical and earth sciences of elementary school teachers. The project will provide basic training for elementary school teachers and also produce leaders from each of 24 elementary schools. Phase I consists of an intensive four-week summer workshop. Phase II includes three all-day sessions on Saturdays during the following academic year. In addition, the project staff will visit classrooms of participant teachers at least once during each semester. Phase III will focus on the training of teacher leaders.

Phases I and II are designed to help teachers that want and need help with their science background and skills. Phase III is designed to recognize and develop those teachers who are already knowledgeable and deserve additional support. These teacher leaders will serve as on-site resource persons for their respective schools, providing assistance to other teachers.

George S. Monk
University of Washington
Seattle, WA 98195

TPE-8650162
$101,672
28 months

"Teaching for Conceptual Understanding"

This Leadership Activities project will directly involve 96 middle school mathematics teachers throughout the state of Washington. Through a 7-week summer intensive phase of the program, teachers will increase their own understanding and application of several basic concepts in mathematics, explore the reasons for student difficulty with these concepts, and actively develop, through projects, revised strategies, methodologies and activities for teaching these concepts.

Supported by follow-up visits by the project staff and a number of meetings through the academic year, the participants will also interact with colleagues in their schools in in-service activities to promulgate teaching for conceptual understanding in other mathematics classrooms. An evaluation model is being developed to ascertain long range impact of the program on both teachers and students.

The participants will be selected from experienced mathematics teachers in the state of Washington. They must have leadership potential and be interested in preparing to change their classroom teaching by deepening their own understanding of mathematics. Each applicant's school district must also agree to support the program through cost-sharing and the assignment of an administrator/supervisor to work with the teacher in the implementation and in-service phase of the project.

Julie H. Lutz
Washington State University
Pullman, WA 99164

TPE-8643364
$122,675
Astronomy/Physics/
Chemistry/Earth
12 months

"A Model to Improve Preservice Elementary Science Teacher Development"

The purpose of this project is to develop a prototype integrated physical science course for prospective elementary school teachers. The prospective teachers will acquire the knowledge and skills to cover fundamental topics in astronomy, physics, chemistry, and earth sciences, and the skill to relate science information to the everyday world. Closely coordinated teaching methods courses will also be designed to bring together science content, science processes, and teaching strategies. Other objectives of the project are to integrate scientific epistemology and relevant history into the courses, design appropriate laboratory activities, integrate modern media, and develop an evaluation, research and dissemination model.

During the first year of the project, the astronomy and physical science courses and their companion methods courses were designed and implemented. During the second year of the project, the second set of courses, emphasizing chemistry and earth science, will be offered together with a second offering of the first set of courses.

WEST VIRGINIA

Presidential Awards for Excellence in Science and Mathematics Teaching

Edward Barlow, Jr.
Mathematics
Central Preston High School
Kingwood, WV 26537

Edward C. Keller
Science
South Junior High School
Morgantown, WV 26505

Fellowships

West Virginia University Morgantown, WV Graduate Research Fellowships Support Grants	$16,350

Protip K. Ghosh	CSI-8650353
Department of Geology	$23,600
Marshall University	Earth Sciences
Huntington, WV 25701	30 months

"Renovation and Upgrading of X-Ray Diffraction and X-Ray Fluorescence Instruments"

The detector units of the x-ray diffraction and x-ray fluorescence instruments in the Geology Department have been converted from out-of-date vacuum tube electronics to solid state circuitry. This provides increased stability and reliability so that these fundamental tools of geological study are used fully in regular course work in mineralogy, geochemistry, petrology and sedimentary petrography. In addition, the analytical potential of the x-ray fluorescence unit has been enhanced by the addition of a dual-target tungsten-chromium x-ray tube.

Eugene J. Volker	CSI-8650378
Department of Chemistry	$10,190
Shepherd College	Chemistry
Shepherdstown, WV 25443	30 months

"An Infrared Spectrophotometer/Data Collecting Station for Undergraduate Chemistry"

This project aims to upgrade the education of chemistry majors and minors at Shepherd College by providing an infrared spectrophotometer-data station combination for student use. The computer-controlled equipment will be utilized by students in Organic Chemistry and in a Computers in Chemistry course, and will expand substantially the opportunities for undergraduates to conduct research. In addition, the project will provide an opportunity to introduce infrared spectroscopy (IR) in local high schools and to teach IR theory and operation to area high school teachers.

E. H. Crum	CSI-8650699
Department of Chemical Engineering	$10,000
West Virginia Institute of Technology	Engineering
Montgomery, WV 25136	30 months

"Improvements in Undergraduate Instruction in Bioengineering, Biotechnology and Sanitary Engineering"

In this joint project of the Chemical and Civil Engineering Departments at West Virginia Institute of Technology, a high performance liquid chromatograph is being used by undergraduates to perform experiments in Bioengineering, Biotechnology and Sanitary Engineering. Students are gaining experience with state-of-the-art analytical instrumentation in the increasingly important interdisciplinary areas involving the biological sciences and engineering.

WISCONSIN

Presidential Awards for Excellence in Science and Mathematics Teaching

Debbie Smieja
Mathematics
DeLong Junior High School
Eau Claire, WI 54703

P. John Whitsett
Science
La Crosse Central High School
La Crosse, WI 54601

Fellowships

Marquette University Milwaukee, WI 53233 Graduate Research Fellowships Support Grants	$16,350
University of Wisconsin - Madison Madison, WI 53706 Graduate Research Fellowships Support Grants	$533,000

Daniel P. Gerrity	CSI-8650903
Department of Chemistry	$13,600
Carroll College	Chemistry
Waukesha, WI 53186	30 months

"Laser Spectroscopy Equipment for an Undergraduate Chemistry Laboratory"

The goal of this project is to assemble the essential components of a versatile laser spectrometer to enable students of physical chemistry to carry out experiments in Raman spectroscopy, time-resolved absorption spectroscopy, and time-resolved fluorescence spectroscopy. The total system includes both a pulsed Nd:YAG laser and a dye laser, as well as a monochromator, a signal processor, and a laboratory computer to store and analyze the data. The spectrometer will be used to introduce students to several phenomena and techniques which are important to current research in chemistry. These include (a) principles and applications of lasers, (b) techniques for measuring very fast processes, (c) manipulation of a sophisticated optical-electronic system, and (d) computer interfacing and control of experiments. This system will also provide an opportunity for chemistry majors to use state-of-the art laser equipment for independent research projects. An important outcome of this project will be the eventual publication of a variety of well-tested, documented experiments for undergraduates using state-of-the-art laser systems. Thus this project can serve as a national model, and contribute to the improvement of chemistry education on the national level.

Dennis P. Strommen	CSI-8650330
Department of Chemistry	$21,037
Carthage College	Chemistry
Kenosha, WI 53141	30 months

"Fourier Transform Spectroscopy in the Undergraduate Laboratory"

The goal of this project is to upgrade and expand the undergraduate chemistry program at Carthage College in the area of infrared spectrophotometry. A Fourier transform infrared spectrophotometer will be used by students in organic chemistry, physical chemistry, instrumental analysis, inorganic chemistry, and undergraduate research. Investigations include: delineating the effects of various molecular substituents on characteristic group frequencies, quantitative analysis of mixtures, structure elucidation and compound identification, determination of vibrational and rotational constants, and determining effects of intercalators on secondary structure of DNA using the FT-IR Circle Cell accessory. Throughout, students will gain experience in computer-controlled instrument operation and computer use of a spectral identification library.

Jerrold P. Lokensgard	CSI-8650298
Department of Chemistry	$20,250
Lawrence University	Chemistry
Appleton, WI 54912	30 months

"Fourier Transform Infrared Spectroscopy"

This project will add a Fourier transform infrared spectrometer and two associated sampling accessories to the Lawrence University chemistry laboratory holdings. This instrument will significantly improve undergraduate laboratory work at Lawrence, especially in organic chemistry, inorganic chemistry, and advanced laboratory courses, and in undergraduate research. It will provide the students with an instrument illustrative of the state of the art in computer-controlled instrumentation and in the application of the fast

Fourier transform to spectroscopy, two revolutionary developments of the past several years to which undergraduates in a high-quality laboratory program need exposure.

John R. Tinker, Jr.	CSI-8650228
Department of Geology	$32,125
University of Wisconsin-Eau Claire	Earth Sciences
Eau Claire, WI 54701	30 months

"Hydrogeological and Geophysical Instrumentation to Enhance Undergraduate Instruction"

Undergraduate instruction in introductory environmental geology, hydrogeology and geophysics is being improved significantly at the University of Wisconsin-Eau Claire by the acquisition of modern instrumentation for seismic studies, earth resistivity measurements, conductivity studies, gamma ray logging, and ground-water flow analysis. In addition, equipment for particle size analysis and for ground water sampling is now available, together with IBM-PC computers for instruction in ground water modeling and contaminant transport for the Eau Claire Water Well and Seven Mile Creek Landfill projects. Students participate in three integrated projects in hydrogeology and geophysics: determining ground-water flow near a municipal well field, identifying leachate migration from an engineered landfill site, and understanding and applying computer techniques to hydrogeology.

Sumner Scott	TPE-8650131
University of Wisconsin	$42,222
Eau Claire, WI 54701	Physics/Physical Science
	12 months

"Summer Workshop for High School Teachers of Physics and Physical Science"

This project is designed for high school teachers of physical science to improve the quality of their instruction, particularly in the laboratory. To achieve this objective, participants will attend a three-week summer workshop dealing with wave motion, sound, and light. Instruction by staff will be provided in the lecture and laboratory mode. Throughout the workshop, participants will focus on the development of their own materials for use in their respective classrooms. Participants will also engage in an academic-year follow-up program intended to determine and enhance the classroom impact of the preceeding summer's activities. This program will include school visitations by the project director and an evaluation meeting of all participants in the spring of the year.

Roland R. Roskos	TPE-8552360
University of Wisconsin	$85,472
La Crosse, WI 54601	Chemistry/Biology/Biotechnology
	12 months

"Teacher Development in Science, Technology, and Society Issues"

The University of Wisconsin at La Crosse will provide teachers in rural Wisconsin, Minnesota, and Iowa with intensive training in energy alternatives, chemicals in society, pollution and aquatic biology, and biotechnology. A three-week summer workshop will review scientific principles, describe technological applications of science, and discuss, at length, the responsibilities of society. Forty selected high school teachers from western Wisconsin, southeastern Minnesota, and northeastern Iowa will experience field trips, special lectures by community professionals, and a large variety of appropriate laboratory activities. Curriculum development will be initiated and implemented with the support of the local school districts.

During the academic year following the workshop, participants will integrate lessons involving technological applications and related societal issues into existing curriculum in their high schools. The project staff will actively assist participants by visiting schools on a regular basis for observation and support. The workshop staff and participants will share responsibility for the dissemination of related educational materials to as many science teachers as possible through attendance at professional meetings as well as at specially developed "sharing" programs.

William T. Lippincott	TPE-8554430
University of Wisconsin	$932,968
Madison, WI 53706	Chemistry
	12 months

"Enhancing Interactive Teaching and Learning in the Precollege Classroom, 1986"

To continue its efforts in initiating and conducting programs to strengthen science education, particularly chemical education, at all precollege levels, the Institute for Chemical Education is offering a series of programs for teachers during the summer of 1986.

Different programs are offered to elementary and middle school teachers of science and high school teachers of chemistry:

(A) Chemistry Update is a six-week content mastery program for chemistry teachers.
(B) Chemical Supplements for Pre-High School Classes is open to elementary, middle, and high school teachers for two weeks.
(E) Chemical Instrumentation Update, for well-prepared high school teachers is offered for two weeks.
(F) Chemistry Can Be Fun Camp includes several one-week programs for middle-school students.

Participants in Programs A and, in particular, Program B will work with the students in Program F and be provided the opportunity to work directly with young students in the chemistry laboratory. The University of Wisconsin-Madison will run all the programs, the University of California-Berkeley will run programs A, and E, the University of Arizona will run programs B, E, and F, and the University of Maryland will run programs A, B, and F.

Three hundred and sixty teachers from all parts of the United States will have an opportunity to participate in the multi-faceted project. Participants will be given a thorough content update, strategies for implementing more effective science education, and training to help them in-service their colleagues upon their return to their home schools. The multiplier effect is built into this project as school systems are asked to take responsibility for partial support of their teachers and to commit themselves to the outreach component of the project.

William Lippincott	TPE-8642538
University of Wisconsin	$223,678
Madison, WI 53706	Chemistry
	12 months

"Enhancing Interactive Teaching and Learning in the Precollege Classroom, 1985"

This project will continue the final testing and evaluation of a model for the continuing education of precollege science teachers. The project was initiated with National Science Foundation support in 1984 at the Institute for Chemical Education of the University of Wisconsin. Support for 1985 enabled the Institute to refine its activities at Madison and to initiate activities at three field centers in order to test the transferability and widespread applicability of the model. The field centers were located at the University of Arizona at Tucson, the University of California at Berkeley, and the University of Maryland at College Park.

The project includes three major activities: (A) a six-week summer course in chemistry designed to upgrade the disciplinary competence of high school science teachers who are assigned to teach chemistry but who do not have a strong background in the field; (B) a two-week program to prepare middle and senior high school science teachers to present chemical demonstrations; (E) a two-week special topic update for experienced high school chemistry teachers. Course A was offered at Madison, Berkeley, and College Park; Course B at Madison, Berkeley, and Tucson; and Course E at Madison and Tucson. An external evaluator reviewed the programs at all of the centers and reported favorable results.

Funding for 1986 will provide for the final testing and evaluation of Courses B and E at Madison.

Fred E. Domann	CSI-8650237
Department of Physics	$19,531
Univ of Wisconsin-Platteville	Physics
Platteville, WI 53818	30 months

"Equipment for Modern Physics and Optics Laboratories"

This project will increase the breadth of the junior/senior laboratory experience for physics and engineering students at the University of Wisconsin, Platteville, by enabling the Physics Department to add topics in nuclear physics, lasers, fiber optics, and vacuum science. Specifically, the Department will purchase optics equipment, including an optical table, helium-neon and nitrogen-dye lasers, and energy meters which, together with optics apparatus already on hand, will enable students to work in an excellent quality optics laboratory. A neutron source will be purchased in order to begin using a newly constructed neutron laboratory, and vacuum equipment will allow students to do work in vacuum science. Much of the equipment will also provide independent project and research opportunities for undergraduate students.

Jack K. Reed	CSI-8650742
Department of Chemistry	$39,000
University of Wisconsin-Stevens Point	Chemistry
Stevens Point, WI 54481	30 months

"Nuclear Magnetic Resonance Spectroscopy for Improving Undergraduate Chemistry Laboratory Capabilities"

The objective of this project is to provide undergraduate students at the University of Wisconsin-Stevens Point with modern instrumental capabilities necessary to support both laboratory coursework and student research projects. A Fourier transform nuclear magnetic resonance spectrometer will be used by undergraduates for laboratory coursework in advanced organic, advanced inorganic, analytical, physical, and polymer chemistry. In addition, a number of students will use Fourier transform NMR techniques in their research projects.

Allan D. Hilgendorf	CSI-8650845
Department of Physics	$11,014
University of Wisconsin-Stout	Physics
Menomonie, WI 54751	30 months

"(MICRO) Computer Based Physics Laboratory"

The Computer Based Physics Laboratory project will result in a model laboratory program for general physics courses, in which students, Apple IIe micro-computers, interfaced measurement modules, and specially developed software will interact to achieve a unique and improved laboratory experience. A series of 30 laboratory software packages, stored on magnetic disk, will assist and direct student procedures, monitor and verify student measurements, aid in analysis, and help eliminate certain traditional laboratory difficulties. Apple IIe computers, printers and measurement modules will also perform as powerful data acquisition and analysis devices. The project will implement a substantially improved curriculum and a model laboratory program, and will have replication value since the software disk series will be available to other institutions.

Shirley S. Williams
University of Wisconsin
Madison, WI 53706

TPE-8552396
FY 86 $691,416
FY 88 $247,179
24 months

"Wisconsin Science Education Service Center"

The Board of Regents of the University of Wisconsin System is embarking on a comprehensive plan for the in-service education of teachers of elementary, middle, and high school through the establishment of Science Education Service Centers at three campuses of the University of Wisconsin. The Wisconsin Department of Public Instruction will cooperate to develop a network of these model science education service centers that will be designed to meet the diverse needs of science teachers from all parts of the state. The three initial center sites chosen represent different population profiles: (1) an urban corridor where the minority population is highest, (2) a medium sized cities area that has both an agricultural and industrial dependence with the highest concentration of native Americans in the state, and (3) a low-density population mostly dependent on agriculture which has attracted a large concentration of Hmong immigrants.

In the first year, the University of Wisconsin (UW)-Green Bay and UW-Milwaukee Centers will provide in-service courses and activities for 75 high school teachers and 40 middle school teachers, respectively. In the second year, the UW-LaCrosse Center will begin operating--along with the continuation of the other two Centers--for the benefit of 50 elementary school teachers. All three Centers will continue to operate at this level in years three and four. Programs at each of the sites include appropriate content courses, laboratory-based activities, and a structured follow-up schedule insuring support for these participating teachers. A network of representatives from these three sites as well as from other UW campuses will function as an advisory committee to this project. This network will also serve as an initiator for similar Centers at additional campus sites throughout the state.

WYOMING

Presidential Awards for Excellence in Science and Mathematics Teaching

Mary Moler
Mathematics
Kelly Walsh High School
Casper, WY 82609

Dana P. Van Burgh
Science
Dean Morgan Junior High School
Casper, WY 82601

Fellowships

University of Wyoming Laramie, WY 82071 Graduate Research Fellowships Support Grants	$49,050

APPENDICES

Appendix A : Graduate Fellowship Awards

Appendix B : Minority Graduate Fellowship Awards

Appendix C : NATO Postdoctoral Fellowship Awards

Lists of fellowship recipients include only those individuals receiving first-time support in FY86.

APPENDIX A
GRADUATE FELLOWSHIP AWARDS
NEW AWARDS - FY86

NAME	HOME STATE	BACCALAUREATE INSTITUTION	FIELD	CHOSEN INSTITUTION
Eric W. Aboaf	NY	U. of Pennsylvania	Electronic Engineering	Stanford Univ.
Gregory Dominic Abowd	MI	U. of Notre Dame	Computer Science	U. of Illinois
Donna Jean Abrahams	NY	City College - CUNY	Nutrition	Cornell University
Victor Steven Abrash	CA	Mass Inst Technology	Electrical Engineering	Mass Inst Tech
Dany Spencer Adams	NY	U. Cal - Berkeley	Biology	U. Cal - Berkeley
Rani Teresa Alexander	FL	Tulane University	Archeology	U. of New Mexico
Joseph Charles Alfano	IL	Northwestern Univ.	Organic Chemistry	U. of Chicago
Judith Leigh Alford	UT	University of Utah	Molecular Biology	U. of Colorado
Ann Stewart Almgren	NJ	Harvard University	Mechanical Engineering	U. Cal - Berkeley
Elizabeth Anne Amatruda	CT	Yale University	Cell Biology	U. of Colorado
Stuart Bruce Anderson	MN	Bethel College (Minn)	Theoretical Physics	Cal Inst Tech
David Claude Aronstein	NY	Princeton University	Aeronautical Engineering	Mass Inst Tech
Robert Neil Ashcroft	NY	Cornell University	Computer Science	Mass Inst Tech
Richard Tillman Austin	KY	Univ. of Kentucky	Electrical Engineering	U. of Illinois
Scott Elliot Axelrod	NJ	Rutgers University	Applied Mathematics	Princeton Univ.
Mary Katherine Babcock	NY	Cornell University	Developmental Psychology	U. of Pennsylvania
Benjamin Tom Backus	CA	Swarthmore College	Experimental Psychology	U. of Pennsylvania
Jean Leslie Bacon	CT	Wesleyan Univ (Conn)	Sociology	Univ. of Chicago
Joel Samuel Bader	PA	Lehigh University	Organic Chemistry	U. Cal - Berkeley
Robert Carl Bailey	CA	U. Cal - Berkeley	Pharmacology	U. of Pennsylvania
Andrew Jackson Baker	AZ	Stanford Univ.	Zoology	Univ. of Maryland
William J. Bandy	OH	Rose-Hulman Tech	Environmntl Engineering	Clemson University
Brent Arnold Banister	WA	Washington State Univ.	Math/Statistics	Washington St U.
Walter Brian Barnes	NJ	Dartmouth College	Applied Mathematics	Princeton Univ.
William Kenneth Barth	OR	Oregon State Univ.	Electrical Engineering	Colorado State U.
William Joseph Bartlett	MO	Mo. Southern State Col	Biochemistry	U. of Kansas
James Howard Barton	TN	Tennessee Tech Univ.	Electrical Engineering	Mass Inst Tech
Laurence Thomas Baxter	NY	Virginia Polytech Inst	Chemical Engineering	Carnegie-Mellon U.
Darin Emerson Beigie	OH	U. of Toronto	Theoretical Physics	U. Cal - Berkeley
Katherine M. Benson	MD	Duke University	Theoretical Physics	Cal Inst Tech
Andrew Gouinlock Berg	MI	Harvard University	Economics	Mass Inst Tech
Sonja Kay Berge	OR	Oregon State Univ.	Genetics	Oregon State Univ.
Micheal Stephen Berger	TX	Mass Inst Technology	Theoretical Physics	Harvard University
Michael Ira Bergman	NY	Columbia University	Geophysics	Harvard University
Charles Anthony Bier	KS	Rice University	Applied Mathematics	Princeton Univ.
Christina Louise Black	PA	Cornell University	Computer Science	Stanford Univ.
David Walter Blackburn	CT	Carleton College	Organic Chemistry	U.Minn-Minneapolis
Paul Bloom	MA	McGill Univ.	Developmental Psychology	Mass Inst Tech
Dale Lesley Bodian	NJ	Yale University	Biochemistry	U. Cal - San Fran.
Allen Richard Boronkay	OH	U. of Cincinnati	Mechanical Engineering	Stanford Univ.
Mark Adrian Bowe	IN	Earlham College	Biochemistry	Purdue University
Michael Dominic Bowen	OK	SUNY at Albany	Microbiology	London Sch Hyg&M
S. Lael Brainard	PA	Wesleyan Univ. (Conn)	Economics	Harvard University
Elizabeth L. Brainerd	VT	Harvard University	Zoology	Harvard University
Susan E. Brennan	MA	Cornell University	Experimental Psychology	Stanford Univ.
Joan Frances Brennecke	TX	U. of Texas	Chemical Engineering	U. of Illinois
Julie Anne Brill	VA	Swarthmore College	Molecular Biology	Mass Inst Tech
Elizabeth Mary Broman	NE	Princeton University	Economics	Yale University
Barbara Susanne Bronder	PA	Ohio State University	Anatomy	U. North Carolina
Michael J. Bronikowski	WI	Cal Inst Technology	Physical Chemistry	Stanford Univ.
John Oliver Brooks	TX	Rice University	Experimental Psychology	Rice University
Karen Suzanne Brown	VA	Princeton University	Biochemistry	Mass Inst Tech
Kathleen Marie Bruhn	OH	Wittenberg University	International Relations	Stanford Univ.
Lisa Diane Brush	CT	U. of Connecticut	Sociology	U. Wisc - Madison
Gina Marie Buccellato	NJ	Mass Inst Technology	Chemical Engineering	U. Cal - Berkeley
Eugene L. Buckley	OR	Univ. of Oregon	Linguistics	U. Cal - Berkeley
Michael David Bunsey	OH	Ohio University	Psychology	Cornell University
John Arthur Burns	TX	Rice University	Organic Chemistry	Harvard University
Melanie Overton Burns	CA	U. of Pennsylvania	Personality Psychology	U. of Pennsylvania
Nancy Elizabeth Burns	TN	U. of Kansas	Political Science	U. of Michigan
David William Bushman	MD	Loyola College (Md)	Entomology	U. of Maryland
Paul Reid Cabe	VA	William & Mary College	Ecology	U.Minn-Minneapolis
Kevin Pat Caffey	CA	Pace University	Analytical Chemistry	Penn State Univ.
Pablo Alberto Calderon	IL	U. Buenos Aires	Mathematics/Analysis	New York Univ.
David M. Cannon	UT	Brigham Young Univ.	Mechanical Engineering	Stanford Univ.

APPENDIX A
GRADUATE FELLOWSHIP AWARDS
NEW AWARDS - FY86

NAME	HOME STATE	BACCALAUREATE INSTITUTION	FIELD	CHOSEN INSTITUTION
Bruce F. Carpenter	IN	Rose-Hulman Tech	Electronic Engineering	Mass Inst Tech
Christopher D. Carroll	TN	Harvard University	Economics	Mass Inst Tech
John Bruce Carter	MA	Rice University	Computer Science	Rice University
David Scott Casebier	WA	Washington State Univ.	Organic Chemistry	Yale Univ Sch Med
Karen Sang Chen	CA	Harvard University	Neuroscience	U.Cal-San Diego
Mara Chibnik	NY	Brown University	Computer Science	Harvard University
Chantal Christ	VA	Mass Inst Technology	Biochemistry	Cornell University
Mark Steven Christenson	WI	Purdue University	Mechanical Engineering	Purdue University
Diane Estella Clemens	CA	UCLA	Geochemistry	Cal Inst Tech
Debra Tamara Cohen	CA	Harvard University	Bioengineering	Mass Inst Tech
Patricia Dawn H. Conley	OH	Washington Univ. (Mo)	Political Science	Univ. of Kentucky
Vincent Paul Conticello	DE	Univ. of Delaware	Inorganic Chemistry	Northwestern U.
Carol Ann Cook	WI	St. Lawrence University	Experimental Psychology	U. of Michigan
Andrew David Cothrel	OH	Ohio State University	Mechanical Engineering	Ohio State Univ.
Alan Keith Cummings	GA	Florida State Univ.	Particle Physics	U. Cal - Berkeley
Charles E. Cunningham	CA	Harvey Mudd College	Fluid Physics	U. Cal - Berkeley
Robert Edward Cypher	NJ	Stanford University	Computer Science	U. of Washington
David Charles Dankworth	TX	Rice Univrsity	Chemical Engineering	Princeton Univ.
Cameron Mack Davidson	WI	U. Wisc - Madison	Geology	U. of Washington
Margaret de Cuevas	NY	Yale University	Molecular Biology	Harvard University
Andrew Paul DeJaco	OH	U. of Dayton	Electrical Engineering	Carnegie-Mellon U.
Rebecca Susan Demsetz	CA	UCLA	Economics	Stanford Univ.
Alan Isaac Derman	NY	Yale University	Microbiology	Harvard Med School
Keith Michael DeVries	MI	Hope College (Mich)	Organic Chemistry	Princeton Univ.
Michael H. Dickinson	PA	Brown University	Zoology	U. of Washington
Kari Ann Diggs	CA	U.Cal-Santa Clara	Microbiology	Stanford Univ.
Paul A. DiMilla	MA	Mass Inst Technology	Chemical Engineering	Stanford Univ.
Gregory Martin Dipple	IN	Indiana University	Geology	Cal Inst Tech
Vincent Gerard Dominic	OH	U. of Dayton	Electrical Engineering	Stanford Univ.
James Dunn	CA	Cal Inst Technology	Bioengineering	Mass Inst Tech
Corey Martin Dunsky	IL	U. of Illinois	Mechanical Engineering	U. Cal - Berkeley
Jeffrey Lawrence Dupuie	MI	Wayne State Univ.	Chemical Engineering	U. of Michigan
Rebecca Lynn E. Dutch	MI	Michigan State Univ.	Biochemistry	Stanford Univ.
Art Duval	AZ	Cal Inst Technology	Math/Algebra	U. Wisc-Madison
Janice Caryl Eberly	CA	U. Cal - Davis	Economics	Harvard University
Lisa P. Echeverria	CA	U. Cal - Berkeley	Geophysics	Cornell University
Deborah Ann Edwards	SC	Clemson University	Chemical Engineering	Va Polytech Inst.
Kari Ellen Edwards	CA	U. Cal - Berkeley	Social Psychology	Yale University
Edward Erling Ehrichs	CO	Stanford University	Physics	Mass Inst Tech
Lise Suzanne Eliot	IL	Harvard University	Neuroscience	Columbia Univ.
Stuart William Elliott	VA	Columbia University	Economics	Mass Inst Tech
Jennifer Sue Epps	MN	Case Western Reserve	Developmental Psychology	Carnegie-Mellon U.
Mark Alan Epstein	FL	U. of Chicago	Computer Science	U. of Chicago
Christopher L. Erickson	CA	Yale University	Economics	Mass Inst Tech
Eirik Aldrich Evenhouse	MI	U. of Michigan	International Relations	Sch Adv Intl Std
Eric David Fajer	NY	Stanford University	Entomology	Harvard University
Pamela Jean Faller	OR	Pacific Lutheran Col	Cell Biology	Harvard University
Kenneth Anthony Farley	NY	Yale University	Geochemistry	U. Cal - San Diego
Michael Wayne Farn	PA	Penn State University	Electrical Engineering	Stanford Univ.
Kurt Lewis Feigl	WA	Yale University	Geophysics	Mass Inst Tech
Paul Edward Filmer	MA	Cal Inst Technology	Geophysics	Mass Inst Tech
Roc Vincent Fleishman	CA	Northrop University	Mechanical Engineering	U.C.-Santa Barbara
Matthew John Fletcher	VA	Virginia Polytech Inst	Mechanical Engineering	Va Polytech Inst
Daniel Norman Frank	IL	U. of Illinois	Molecular Biology	U. Cal - Berkeley
Simon James Frankel	CT	Harvard University	History of Science	Princeton Univ.
Denise Elaine Freed	NY	Cornell University	Theoretical Physics	Princeton Univ.
Daniel Jay Freidus	NY	Amherst College	Ecology	U.Minn-Minneapolis
Claire Ellen H. Frey	MN	U. of Miami (Fla)	Industrial Engineering	U. of So. Calif.
Stephen Jeffrey Fromm	IA	Princeton University	Mathematics/Analysis	Mass Inst Tech
Ivan Kinji Fukumoto	HI	Stanford University	Sociology	U. Wisc - Madison
James Randolph Gage	CT	Calvin College (Mich)	Organic Chemistry	Harvard University
Douglas Aziz Galbi	NY	Princeton University	Computer Science	U. Cal - Berkeley
Gerald Herbert Gamm	MA	Harvard University	Political Science	Harvard University
Erann Gat	TN	Virginia Polytech Inst	Computer Science	Stanford Univ.
William Joseph Gehring	IL	Augustana College (Ill)	Experimental Psychology	U. of Illinois

APPENDIX A
GRADUATE FELLOWSHIP AWARDS
NEW AWARDS - FY86

NAME	HOME STATE	BACCALAUREATE INSTITUTION	FIELD	CHOSEN INSTITUTION
Andrew Eric Gelman	MD	Mass Inst Technology	Solid State Physics	U. Cal - Berkeley
Sarah Lee Gibbons	CA	Harvard University	Sociology	U. Cal - Berkeley
Richard Grant Gibson	MO	Central Mo. State Univ.	Math/Algebra	U. Cal - Berkeley
Richard L. Gibson	CO	Baylor University	Geophysics	Mass Inst Tech
George W. Gilchrist	AZ	Arizona State Univ.	Ecology	Brown University
John Malcolm Godfrey	TX	U. of Texas	International Relations	Stanford Univ.
Alan Robert Godwin	NM	Pomona College	Genetics	Yale University
James Ronald Gord	OH	Miami University (Oh)	Analytical Chemistry	Purdue University
Philip Stephen Gorski	IL	Harvard University	Sociology	U. of Frankfurt
Jon Kazuhiko Gotow	VA	Duke University	Mechanical Engineering	Mass Inst Tech
Adam Michael Gottlieb	NY	Harvard University	Computer Science	Mass Inst Tech
Gustavo Enrique Grampp	WI	U. Wisc - Madison	Bioengineering	Mass Inst Tech
Michael Timothy Green	CA	U. Cal - Berkeley	Ecology	U. North Carolina
Diana Mae Greenlee	WA	U. of Washington	Archeology	U. of Arizona
Lydia Maria Gregoret	MN	Boston University	Neuroscience	U. Cal - San Fran.
Michelangelo Grigni	NC	Duke University	Computer Science	Mass Inst Tech
Edward Franklin Grove	RI	Brown University	Computer Science	U. Cal - Berkeley
Lloyd Gerard Gruber	GA	Harvard University	Sociology	Oxford University
Karl Robert Gutschera	IL	Harvard University	Math/Geometry	Princeton Univ.
Judith Kay Guy	TX	Trinity University	Biochemistry	Stanford Univ.
Eric Davis Gyllenhaal	PA	Ohio State University	Paleontology	U. of Chicago
Ann Marie Haberman	WI	U. Cal - Berkeley	Microbiology	U. Penn Sch Med
Joe David Hadden	CA	Yale University	Theoretical Physics	Princeton Univ.
Karla Lynn Hahn	OH	Wittenberg University	Genetics	U. of Chicago
Kenneth H. Hahn	CA	Cal Inst Technology	Nuclear Physics	Stanford Univ.
Max Hailperin	PA	Mass Inst Technology	Computer Science	Stanford Univ.
Jerry Carl Hamann	WY	U. of Wyoming	Electrical Engineering	U. of Wyoming
Philip Eugene Hammer	IA	Iowa State University	Botany	U. Cal - Davis
Mark David Hansen	NY	Cornell University	Math/Logic	Harvard University
Marta Eileen Hanson	MN	Brown University	History of Science	U. of Pennsylvania
Michael John Hanson	WA	U. of Washington	Computer Science	Stanford Univ.
Karen Swanson Harpp	NH	Dartmouth College	Geochemistry	Cornell University
Catherine Loring Harris	CA	Harvard University	Experimental Psychology	U.Cal-San Diego
Walter Carl Hartwig	TN	U. of Missouri	Anthropology	U. Cal - Berkeley
Erica Lyn Harvey	OH	Wellesley College	Inorganic Chemistry	Cal Inst Tech
Peter David Harvie	ME	U. of Maine	Cell Biology	Penn State Univ.
Miriam Sarah Hasson	IL	Yale University	Biochemistry	Stanford Univ.
Graham Philip Head	NJ	Monash U. - Australia	Biology	Princeton Univ.
Fred Roy Heath	TX	Texas A&M University	Experimental Psychology	Stanford Univ.
Stanley Heckman	TX	Michigan State Univ.	Fluid Physics	Princeton Univ.
James David Heidman	OH	Univ. of Toledo	Mechanical Engineering	Purdue University
Katherine Ann Heimes	IA	Carleton College	Geology	Stanford Univ.
John Paul Hernandez	CA	U. Cal - Berkeley	Political Science	U. Cal - Berkeley
Alison Jean Herrold	IN	DePauw University	Social Psychology	Stanford Univ.
Anita Joyce Hill	TN	Duke University	Materials Engineering	Duke University
Russell James Hill	IA	Haverford College	Molecular Biology	Stanford Univ.
Martha Jean Hiller	MN	Mass Inst Technology	Computer Science	Mass Inst Tech
Jeffrey Alan Hintzman	KS	Stanford University	Electronics Engineering	Stanford Univ.
Christopher R. Hitchcock	NJ	Princeton University	History of Science	Stanford Univ.
Rebecca Lynn Hoff	AZ	Univ. of Arizona	Physical Chemistry	U. Cal - Berkeley
Loredana Holmes	MA	Queens College - CUNY	Linguistics	Mass Inst Tech
Bernadette V. Holthuis	CA	U. Cal - Davis	Zoology	U. of Washington
Jessica Hopfield	NY	Yale University	Neuroscience	Washington U. (Mo)
Margat Eileen Hoppe	PA	Wellesley College	Physical Chemistry	Stanford Univ.
Thomas Albro Houpt	NY	Harvard University	Physiology	Harvard University
David Allen Houston	IN	Northwestern Univ.	Social Psychology	Indiana University
Everett William Howe	CA	Cal Inst Technology	Math/Algebra	U. of Illinois
Estelle Marie Hrabak	PA	Michigan State Univ.	Phytopathology	Cornell University
Michael Robert Hudec	MN	Amherst College	Geology	Mass Inst Tech
Douglas Malvern Hudgins	MI	Adrian College (Mich)	Organic Chemistry	Cornell University
Kimberly Ann Hughes	TX	Rice University	Ecology	Harvard University
Douglas Earl Humphrey	TN	Bucknell University	Mechanical Engineering	Mass Inst Tech
Nancy Ruth Hunkeler	WI	U. Wisc - Madison	Bioengineering	U.Minn-Minneapolis
William Ben Hunt	AL	Vanderbilt Univ.	Political Science	Harvard University
Hugh Edgar Huntley	PA	U. of Michigan	Mechanical Engineering	U. of Michigan

APPENDIX A
GRADUATE FELLOWSHIP AWARDS
NEW AWARDS - FY86

NAME	HOME STATE	BACCALAUREATE INSTITUTION	FIELD	CHOSEN INSTITUTION
Lorraine Joyce Hwang	CA	U. Cal - Berkeley	Geophysics	Cal Inst Tech
Kenneth Dwight Irvine	CA	Williams College	Biochemistry	Stanford Univ.
Paul Bernard Jackson	NC	Cambridge University	Physics	Princeton Univ.
Joseph David Jacobs	MO	NW Missouri State Univ.	Computer Science	Stanford Univ.
Catherine Helen Jacobus	AZ	Univ. of Arizona	Anthropology	Harvard University
Paul Andrew James	NE	Rice University	Mechanical Engineering	Stanford Univ.
Lisa Claire Jeffrey	NJ	Princeton University	Theoretical Physics	Harvard University
Mark Robert Jenike	OH	Harvard University	Anthropology	Harvard University
William Shier Jenks	CA	UCLA	Organic Chemistry	Harvard University
Amy Elizabeth Jetton	TN	U. of Tennessee	Physiology	Northwestern U.
Catherine Marie Johnson	WA	U. of Washington	Molecular Biology	U. Wisc - Madison
Erica Susan Johnson	GA	Vanderbilt University	Biochemistry	Mass Inst Tech
Julie Ann Johnson	IL	U. of Pennsylvania	History of Science	U. of Pennsylvania
Lynda Kaye Johnson	IA	Wartburg College (Ia.)	Inorganic Chemistry	U. Wisc - Madison
Scott Eugene Johnson	NM	U. of New Mexico	Geology	James Cook U (Aus)
Jason Errol Johnston	AL	Tulane University	Chemical Engineering	U. Cal - Berkeley
Nikola Maria Juhasz	OH	Purdue University	Bioengineering	Mass Inst Tech
Pamela Jane Kaisaki	CA	UCLA	Nutrition	U. Wisc - Madison
Kathlyn Ann Karwski	VA	George Mason Univ.	Engineering	U. Cal - Berkeley
Margaret Mary Keane	OH	Harvard University	Experimental Psychology	Carnegie-Mellon U.
Frederick Joseph Keith	GA	Univ. of Virginia	Electrical Engineering	U. of Virginia
Brian Arthur Kell	CA	U. Cal - Berkeley	Chemical Engineering	Mass Inst Tech
Cheryl A. Kelley	MN	U. Minnesota - Duluth	Geochemistry	U. of No. Carolina
Anne E. Kendall	NY	Simmons College (Mass)	Nutrition	Cornell University
Ann Patricia Kinzig	IL	U. of Illinois	Physics	U. CAl - Berkeley
Dahv A. V. Kliner	CA	U. Cal - Santa Cruz	Physical Chemistry	Stanford Univ.
Daniel J. Klingenberg	MO	U. Missouri - Rolla	Chemical Engineering	U. of Illinois
Michael Robert Koelle	WA	U. of Washington	Molecular Biology	Cal Inst Tech
Matthew Jeremy Kohn	OH	Mass Inst Technology	Geology	Princeton Univ.
Chris Alan Kortge	MI	Oakland Univ. (Mich)	Experimental Psychology	Carnegie-Mellon U.
Jeffrey Joseph Kosowsky	MA	Harvard University	Bioengineering	Mass Inst Tech
Robert Kovelman	NY	Columbia University	Molecular Biology	Rockefeller Univ.
Carl Emil Krill	OH	U. of Notre Dame	Physics/Optics	Cal Inst Tech
Bruce Stuart Kristal	MA	Mass Inst Technology	Molecular Biology	Harvard Med School
Barbara Nicole Kunkel	CA	U. Cal - Davis	Genetics	Harvard University
Charles Taylor Kurzman	DC	Harvard University	Sociology	U. Cal - Berkeley
Stephen Joseph Lachance	RI	Dartmouth College	Ecology	Michigan State U.
Robert Kevin Lade	ME	U. of Maine	Electrical Engineering	Mass Inst Tech
Peter Jerome Lamble	MO	U. of Detroit	Materials Engineering	Va. Poly Inst
Howard Robert Last	IN	Purdue University	Metallurgic Engineering	Purdue Univ.
Mark William La Starza	FL	Univ. of Florida	Biochemistry	Stanford Univ.
Susan Marie H. Lawler	NE	Grinnell College	Genetics	Washington U. (Mo)
Elizabeth Jane Lawlor	RI	Brown University	Archeologoy	U. Cal - Riverside
Taylor Walton Lawrence	AL	Cal Inst Technology	Particle Physics	U.Cal - Berkeley
David N. Lawson	NY	Michigan State Univ.	Biochemistry	U. Wisc - Madison
Fred Lazarovici	NY	Cooper Union (NY)	Electronics Engineering	Cooper Union
Karen Ko-chia Lee	IL	Mass Inst Technology	Chemical Engineering	U. Wisc - Madison
Mark Lee	NJ	Harvard University	Solid State Physics	Stanford Univ.
Jeffry Alan Leer	OR	Evergreen St College	Linguistics	U. of Chicago
Laura Brandt Leete	CA	U. Cal - Berkeley	Economics	Harvard University
Leann Marie Lesperance	FL	Marquette University	Bioengineering	Marquette Univ.
Michael Jon Liebman	IL	Clemson University	Chemical Engineering	U. of Texas
James T. Liu	IL	Cal Inst Technology	Theoretical Physics	Princeton Univ.
Daniel Elliott Loeb	IL	Cal Inst Technology	Mathematics/Algebra	Mass Inst Tech
Pamela Jane Loprest	PA	Mass Inst Technology	Economics	Harvard University
Elizabeth Claire Losos	MO	Harvard University	Ecology	U. of Washington
Haw-minn Lu	VA	Mass Inst Technology	Mathematics/Analysis	Mass Inst Tech
Steven John Luck	WI	Reed College (Ore)	Experimental Psychology	U. Cal - San Diego
Jan Marie Ludlow	MD	Virginia Polytech Inst	Chemical Engineering	Cornell University
Erik Roland Lundin	AZ	Fort Lewis College	Geology	Univ. of Arizona
James Bernard Magee	NY	U. of Pennsylvania	Electrical Engineering	Stanford Univ.
Peter Matthew Magyar	NJ	Princeton University	Math/Algebra	Harvard University
Christopher M. Malone	CA	Harvard University	Computer Science	Stanford Univ.
Joseph Rocco Manuppello	PA	U. of Delaware	Molecular Biology	U. of Pennsylvania
Susan B. Marcovitz	FL	Brandeis University	Psychology	Brown University

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GRADUATE FELLOWSHIP AWARDS
NEW AWARDS - FY86

NAME	HOME STATE	BACCALAUREATE INSTITUTION	FIELD	CHOSEN INSTITUTION
Emilie Anne Marcus	NY	Wesleyan Univ (Conn)	Neuroscience	Yale Univ Sch Med
Richard Stuart Margolin	NJ	Yale University	Math/Algebra	Princeton Univ.
Peter Seth Margolis	NJ	Haverford College	Genetics	U. Wisc - Madison
Margaret Rose Martonosi	NY	Cornell Univrsity	Electrical Engineering	Mass Inst Tech
Joseph C. Martz	NM	Texas Tech Univ.	Chemical Engineering	U. Cal - Berkeley
Thomas Arthur Matches	MO	U. of Kansas	Neuroscience	Washington U. (Mo)
Elizabeth Jipson Matt	IL	Univ. of Iowa	Social Science	Northwestern U.
John Paul McCarten	KS	Wichita State Univ.	Atomic Physics	Cornell University
Heather B. McDonald	CO	Washington Univ. (Md)	Cell Biology	Harvard University
Andrew F. McDowell	TX	Rice University	Theoretical Physics	Mass Inst Tech
Terrie Ann McLaughlin	IL	US Air Force Academy	Electrical Engineering	Stanford Univ.
Nicholas Freitag McPhee	TX	Reed College (Ore)	Computer Science	Stanford Univ.
David Owen Meltzer	IL	Yale University	Economics	Mass Inst Tech
Pamela L. Metz	FL	Wellesley College	Political Science	Princeton Univ.
Ricardo Baer Metz	MD	Johns Hopkins Univ.	Physical Chemistry	U. Cal - Berkeley
Jennifer E. Mihalick	NY	Princeton University	Physical Chemistry	Stanford Univ.
Cynthia Kay Miller	DE	Univ. of Michigan	Geophysics	Cal Inst Tech
Mary Elizabeth Mills	MN	U. Western Ontario	Anthropology	U. Cal - Berkeley
Deborah F. Minehart	VA	Harvard University	Mathematics/Analysis	U. Cal - Berkeley
Jeffrey Hal Miner	TN	Northwestern Univ.	Biology	Johns Hopkins U.
Susan Marie Miner	OH	U. of Dayton	Chemical Engineering	Cal Inst Tech
Sima Misra	LA	Rice University	Molecular Biology	Stanford Univ.
Robert DeVore Mitchell	MI	Case Western Reserve	Computer Science	U. Wisc - Madison
Christopher David Moore	IL	Northwestern Univ.	Theoretical Physics	Princeton Univ.
Roland Scott Moore	CA	Pomona College	Anthropology	U. Cal - Berkeley
John Demeritt Moores	ME	Rensselaer Polytech	Electrical Engineering	Mass Inst Tech
Roger David Morrison	NY	Princeton University	Experimental Psychology	Cornell University
Vance Palmer Morrison	PA	Northwestern University	Electronics Engineering	U. Cal - Berkeley
Thomas Paul Mucciaro	CA	Occidental College	Organic Chemistry	Mass Inst Tech
Karl Philip Mueller	NY	U. of Chicago	Political Science	Princeton Univ.
Deborah Ann Muenchrath	CA	Iowa State Univ.	Agronomy	U.Minn-Minneapolis
Lorraine M. S. Mulfinger	PA	Penn State University	Veterinary Science	Penn State Univ.
Laura Jean Mundschau	WI	U. Wisc - Madison	Agriculture	U. Wisc - Madison
Chetan Ram Murthy	TX	Rice University	Computer Science	Cornell University
Aviva Sara C. Must	NY	New York University	Nutrition	Tufts University
David John Myhre	WA	Brown University	Sociology	Cornell University
Michael Lenn Myrick	NC	NC State University	Physical Chemistry	NC State Univ.
Juliana Nash	KS	U. of Colorado	Biology	Stanford Univ.
John David Nason	CA	U. Cal - Davis	Botany	U. Cal - Riverside
Denise Marie Neapolitan	IL	Northwestern Univ.	Linguistics	Stanford Univ.
Lori Jean Nelson	IA	University of Iowa	Social Psychology	Yale University
Lee Aaron Newberg	PA	Mass Inst Technology	Mathematics	Princeton Univ.
Anna Pearl Newman	MA	Harvard University	Cell Biology	Yale University
John-Thomas C. Ngo	CA	Cambridge University	Biophysics	Harvard University
Derrick Huy Nguyen	CA	Cal Inst Technology	Electrical Engineering	Stanford Univ.
Andrew Dow Nicholson	TX	Michigan State Univ.	Geochemistry	Colorado Sch Mines
Krishna Kumar Niyogi	TN	Johns Hopkins Univ.	Biochemistry	Harvard University
Edward Colburn Norton	MA	Princeton University	Economics	Mass Inst Tech
Janet Elaine Novak	WV	Brown University	Molecular Biology	Princeton Univ.
Steven Louis Novick	FL	U. Central Florida	Biochemistry	Cal Inst Tech
Joseph Paul Ogas	CA	Stanford University	Organic Chemistry	Cal Inst Tech
David Tatsuyuki Okamoto	MD	Mass Inst Technology	Chemical Engineering	U. Wisc - Madison
Jean Elizabeth Olson	OH	Miami University (Oh)	Economics	London Sch Econ
Mitchell H. Oslick	PA	Mass Inst Technology	Electrical Engineering	Stanford Univ.
Erin MacKenzie Page	WA	Carleton College	Economics	Harvard University
Mark Alan Palmer	MI	Princeton University	Physical Chemistry	U. of Chicago
Robert Glenn Parker	NY	SUNY at Stony Brook	Mechanical Engineering	U.Minn-Minneapolis
Mark A. Patel	NY	Polytechnic Inst NY	Mechanical Engineering	Mass Inst Tech
Heidi Ann H. Pattee	CO	Colorado School Mines	Mechanical Engineering	Colo State Univ.
Daniel Eugene Paul	MD	Duke University	Mechanical Engineering	Duke University
Janet Elizabeth Pawel	TN	U. of Tennessee	Engineering	U. of Tennessee
Frank Edwin Peterkin	NE	U. of Nebraska	Electrical Engineering	U. of Nebraska
Mitchell Alan Petersen	IA	Princeton University	Economics	Mass Inst Tech
Michael Downes Peterson	CA	Princeton University	Math/Operations Res	Mass Inst Tech
Michelle D. Peterson	OH	Wellesley College	Cell Biology	Yale University

APPENDIX A
GRADUATE FELLOWSHIP AWARDS
NEW AWARDS - FY86

NAME	HOME STATE	BACCALAUREATE INSTITUTION	FIELD	CHOSEN INSTITUTION
Scott David Peterson	MN	U. Minn - Minneapolis	Agriculture	U. Wisc - Madison
Irena B. Petsche	NY	Cooper Union (NY)	Chemical Engineering	Princeton Univ.
Patrick C. Phillips	CA	Reed College	Ecology	U. Cal - Berkeley
Karen Lee Pieper	TN	Rice University	Computer Science	Stanford Univ.
Marie C. Pizzorno	CA	Whittier College	Biochemistry	Johns Hopkins Med
Kevin W. Plaxco	CA	U. Cal - Riverside	Molecular Biology	Cal Inst Tech
Robert David Podolsky	NY	Princeton University	Ecology	U. of Michigan
Douglas Neil Poland	MI	U. of Michigan	Nuclear Engineering	U. of Michigan
Jonathan Robert Pollack	NJ	Harvard University	Genetics	Stanford Univ.
Nancy S. Pollard	OH	U. of Houston	Electrical Engineering	Mass Inst Tech
Thomas Joseph Povsic	OH	Bowling Green St U.	Biochemistry	Stanford Univ.
Kimberly Kae Powlishta	MO	Washington Univ. (Mo)	Developmental Psychology	Stanford Univ.
James Calvin Preisig	CA	US Coast Guard Academy	Electronics Engineering	Mass Inst Tech
Daphne Kay P. Preuss	CO	Univ. of Denver	Biology	Mass Inst Tech
Kevin Lee Prime	WI	Northwestern Univ.	Organic Chemistry	Harvard University
Pamela Cole Prosser	WI	Dartmouth College	Neuroscience	Harvard University
Deborah Jane Pruitt	NC	Univ. of Maryland	Anthropology	U. Cal - Berkeley
John Maurice Quashnock	NJ	McGill Univ. (Can)	Particle Physics	Princeton Univ.
Branko Radosavljevic	IL	U. of Illinois	Electrical Engineering	U. of Illinois
Daniel Charles Ralph	KY	Vanderbilt University	Solid State Physics	Princeton Univ.
Keith Andrew Ramsay	CO	Univ. of Chicago	Mathematics/Algebra	Princeton Univ.
Timothy W. Rand	ND	U. of North Dakota	Electrical Engineering	Mass Inst Tech
Andrew Marshall Rappe	PA	Harvard University	Biochemistry	Cal Inst Tech
George William Rebeck	OH	Cornell University	Pharmacology	Harvard Med School
Michael W. Redmond	CA	Harvey Mudd College	Particle Physics	Cal Inst Tech
Bernard Bowman Rees	LA	U. Southwestern La.	Physiology	U. Cal - Irvine
Peter J. Reimers	KS	Kansas State Univ.	Phytopathology	Kansas State Univ.
Elizabeth M. Reninger	IL	Northwestern Univ.	Sociology	U. Wisc - Madison
Paul Jonathan Resnick	PA	U. of Michigan	Computer Science	Carnegie-Mellon U.
Deborah Beata G. Ribet	CT	New York University	Molecular Biology	U. of So. Florida
Lee Remo Riciputi	ME	Carleton College	Geochemistry	U. Wisc - Madison
Alexander Jesse Rimberg	NC	Harvard University	Solid State Physics	U. Cal - Berkeley
John E. Robb	NJ	U. of Chicago	Archeology	U. of Michigan
Mark Windsor Roberson	GA	Wake Forest Univ.	Solid State Physics	Cornell University
John Edward Rogers	VA	U. of Virginia	Organic Chemistry	Mass Inst Tech
Mark William Roggenbuck	MI	Northern Michigan Univ.	Physical Chemistry	Syracuse Univ.
Daniel J. Rosen	VA	Stanford University	Neuroscience	Columbia Univ.
Ronald Rosenfeld	IL	Tel Aviv Univ.	Computer Science	Mass Inst Tech
Patrick Nelson Ross	IL	U. Wisc - Madison	Ecology	U.Cal-Santa Barb.
Edward Eric Rothberg	NJ	Stanford University	Computer Science	Stanford Univ.
W. Bart Rothwell	CA	U. Cal - Berkeley	Experimental Psychology	Stanford Univ.
Fred William Rottnek	MO	Furman University	Organic Chemistry	Harvard University
Stewart Alan Rounds	IL	U. of Illinois	Environmental Chemistry	Oregon Grad Ctr
James Robert Russell	CT	Mass Inst Technology	Computer Science	Stanford Univ.
Mary Catherine Russell	CA	Michigan State Univ.	Microbiology	Harvard University
Gregory C. Rutledge	GA	Univ. of Virginia	Chemical Engineering	Mass Inst Tech
Martin Francis Ryba	OH	Case Westrn Reserve	Theoretical Physics	Princeton Univ.
James Gregory Salter	GA	Princeton University	Mechanical Engineering	Stanford Univ.
Wendy Saltzman	CA	U. Cal - San Diego	Ecology	U. Cal - Davis
Nicole Suzanne Sampson	NY	Harvey Mudd College	Organic Chemistry	U. Cal - Berkeley
Jon Carl Sandberg	WA	U. of Washington	Atomic Physics	Stanford Univ.
Steven Sanders	NY	Yale University	Solid State Physics	Stanford Univ.
David John Sandstrom	CA	U. Cal - San Diego	Neuroscience	U. Cal - Berkeley
Cathy Marie Savage	NY	Yale University	Molecular Biology	Columbia Univ.
Robert Michael Scales	WA	U. Cal - Santa Cruz	Geography	U. of Washington
Peter Clifton Scharf	WI	U. Wisc - Madison	Agronomy	Va Polytech Inst
Howard Glenn Schild	NY	Case Western Reserve	Material Engineering	U.Mass-Amherst
Joel F. Schildbach	OR	Oregon State Univ.	Microbiology	Johns Hopkins U.
Edith K. Schimmerling	CA	U. Cal - Berkeley	Biology	Cal Inst Tech
Thomas M. Schipporeit	NE	U. of Nebraska	Civil Engineering	U. Cal - Berkeley
Kevin Wayne Schneider	MO	U. Missouri - Rolla	Electrical Engineering	U. Mo. - Rolla
William F. Schneider	MI	U. Michigan - Dearborn	Inorganic Chemistry	Mass Inst Tech
Michael Felix Schober	CA	Brown University	Developmental Psychology	Stanford Univ.
Sarah Ann Schofield	PA	U. Cal - Brkeley	Physical Chemistry	U. of Chicago
Eric John Schwabe	NY	Carnegie-Mellon Univ.	Applied Mathematics	Mass Inst Tech

APPENDIX A
GRADUATE FELLOWSHIP AWARDS
NEW AWARDS - FY86

NAME	HOME STATE	BACCALAUREATE INSTITUTION	FIELD	CHOSEN INSTITUTION
Benjamin Joel Schwartz	MI	U. of Michigan	Physical Chemistry	U. Cal - Berkeley
Deborah Lee Scott	OR	Colorado College	Geology	Duke University
Maureen Anne Scully	MA	Harvard University	Social Science	Stanford Univ.
Hans Martin Seidel	PA	Princeton University	Organic Chemistry	Harvard University
Stephen B. Selipsky	WA	Harvard University	Space Physics	Stanford Univ.
Hyunjune S. Seung	TX	Harvard University	Theoretical Physics	Harvard University
Bradley Ross Sevetson	IL	Grinnell College	Biochemistry	Cal Inst Tech
David Shao	MO	Michigan State Univ.	Math/Statistics	Cornell University
John Stephen Shea	IL	Northwestern Univ.	Economics	Harvard University
Thomas Clair Sheahan	CT	Union Univ. (NY)	Civil Engineering	Mass Inst Tech
Margaret Mary Shiffrar	CA	U. Cal - Santa Cruz	Developmental Psychology	Stanford Univ.
John Edward Sholes	OH	West Virginia Univ.	Mechanical Engineering	W. Virginia Univ.
Joel David Shore	MD	Haverford College	Theoretical Physics	Cornell University
Marc J. Sibilia	NJ	Princeton University	Mechanical Engineering	Mass Inst Tech
Stephanie Frank Singer	DC	Yale University	Computer Science	Stanford Univ.
Gordon Scott Skinner	CO	Colorado State Univ.	Electrical Engineering	Colo. State Univ.
Diane Elaine Sklensky	CA	U. Cal - Berkeley	Botany	Cornell University
Michael Jude Slifker	FL	U. of Pennsylvania	Computer Science	Cornell University
Kelly Dawn Sloan	NY	Columbia - Barnard	Linguistics	Mass Inst Tech
Robert Hal Sloan	NY	Yale University	Computer Science	Mass Inst Tech
John Willard Slocum	IL	U. of Illinois	Political Science	U. of Chicago
Lincoln Todd Smith	IL	U. of Illinois	Math/Operations Res	U. of Michigan
Paul Andrew Smith	CA	Harvard University	Physical Chemistry	Cal Inst Tech
David Michael Solomon	PA	Carnegie-Mellon Univ.	Engineering Mechanics	Harvard University
Jody Fran Solow	CA	U. Cal - Santa Cruz	Earth Sciences	U. Cal - Berkeley
Richard Bucher Sowers	CA	Drexel University	Electrical Engineering	Univ. of Maryland
Suzanne Anita Sprunger	PA	Cornell University	Molecular Biology	U. Cal - Berkeley
Douglas Owen Staiger	MI	Williams College	Economics	Mass Inst Tech
Edith Nelson Starr	PA	Harvard University	Math/Topology	Mass Inst Tech
Brian Winfield Sterling	TX	Texas A&M University	Nuclear Physics	U. Cal - Berkeley
William Philip Stevens	KY	Harvard University	Genetics	U. of Chicago
Robert Louis Stevenson	PA	U. of Delaware	Electrical Engineering	U. of Illinois
Ronald Mason Stewart	TX	U. of Texas	Molecular Biology	U. Cal - Brkeley
David Whalen Stock	TX	Texas A&M - Galveston	Genetics	U. of Illinois
Lars Andreas Stole	MO	U. of Illinois	Economics	Mass Inst Tech
Valerie Elaine Stone	MD	Harvard University	Experimental Psychology	Stanford Univ.
Eric Thomas Stoneking	IN	Tri-State University	Aeronautical Engineering	Stanford Univ.
Karin Joan Stromswold	NH	Harvard University	Developmental Psychology	Mass Inst Tech
Meera V. Sundaram	MD	Mount Holyoke College	Genetics	Cornell University
Stephanie Lin-Lin Sung	OH	Ohio State University	Chemical Engineering	Mass Inst Tech
Myles Andrew Sussman	CO	Cal Inst Technology	Aeronautical Engineering	Stanford Univ.
Pamela Joan Sweeney	MN	Carnegie Mellon Univ.	Chemical Engineering	U.Minn-Minneapolis
Jonathan King Tash	AZ	Cal Inst Technology	Theoretical Physics	Harvard University
Ian Lance Taylor	MA	Yale University	Computer Science	Mass Inst Tech
Cynthia Paige Tharpe	VA	James Madison Univ.	Applied Mathematics	Duke University
Brenda Susanne Thies	TX	Texas A&M University	Physical Chemistry	Cal Inst Tech
Susan Marie Tholen	KS	U. of Kansas	Space Physics	Stanford Univ.
Emily Ann Thompson	PA	Rochester Inst Tech	History of Science	Harvard University
Peter Ian Tokofsky	CA	U. Cal - Berkeley	Social Sciences	U. of Pennsylvania
Susan Elizabeth Trolier	PA	Penn State University	Material Engineering	Penn State Univ.
Mitchell David Trott	NY	Case Western Reserve	Engineering	Case Western Res.
Linda B. Tucker	LA	U. of New Orleans	History of Science	Johns Hopkins U.
Dorothy M. Turetsky	FL	Mass Inst Technology	Neuroscience	U.Cal-San Fran.
Terry Lynn Turnipseed	MS	Mississippi State Univ.	Social Science	Mass Inst Tech
Katharine Susan Ullman	MI	Northwestern University	Microbiology	U. Cal - Berkeley
Michael H. Van Kleeck	NY	Amherst College	Experimental Psychology	Harvard University
Richard Alaric Vaughan	VA	U. of Virginia	Computer Science	Stanford Univ.
Paul Douglas VerNooy	NH	Yale University	Physical Chemistry	Stanford Univ.
Linda Ann Vigilant	NJ	Stevens Inst Tech	Genetics	Johns Hopkins U.
Jonathan Eaton Visick	NM	Brigham Young Univ.	Microbiology	U. of Washington
Susan Ann Visser	CA	Mass Inst Technology	Molecular Biology	U. Wisc - Madison
Eric Tin Vu	TX	U. of Texas	Neuroscience	UCLA
Daniel Hugh Wachsstock	NY	U. of Miami (Fla)	Biophysics	Johns Hopkins U.
Paul S. Wagenknecht	FL	Furman University	Inorganic Chemistry	Mass Inst Tech
Byron Lee Walden	KY	Vanderbilt University	Math/Algebra	U. Cal - Berkeley

APPENDIX A
GRADUATE FELLOWSHIP AWARDS
NEW AWARDS - FY86

NAME	HOME STATE	BACCALAUREATE INSTITUTION	FIELD	CHOSEN INSTITUTION
Paul Judson Wallace	MD	George Washington Univ.	Geology	U. Cal - Berkeley
Frank Yu-Heng Wang	OK	Princeton University	Math/Algebra	Harvard University
David Louis Wank	PA	Oberlin College	Sociology	Harvard University
Susan Ivy Waters	OH	Princeton University	Biochemistry	Stanford Univ.
Jacob Andreas Wegelin	OR	U. of Washington	Mathematics/Analysis	U. of Chicago
James David Weiss	MN	Kenyon College (Oh)	Political Science	U. Wisc - Madison
Dick Philip Welch	IL	U. of Illinois	Electrical Engineering	Mass Inst Tech
David Leighton Wells	AZ	Univ. of Arizona	Biological Engineering	Johns Hopkins U.
Paul Steven Wennberg	VT	Oberlin College	Analytical Chemistry	U. of Michigan
Alexander John Werth	MA	Duke University	Anatomy	Harvard University
David Robert Wessner	PA	Franklin-Marshall Col	Microbiology	Harvard University
Charles Lowell West	NY	Princeton University	Geophysics	Mass Inst Tech
Karen Marie Westine	TX	U. of Rochester	Psychometrics	Cornell University
Heather Leigh Whirlow	PA	Grove City College	Biochemistry	Duke University
Paul Michael Whitaker	PA	Carnegie-Mellon Univ.	Electrical Engineering	Mass Inst Tech
Jonathan Adam Wickert	CA	U. Cal - Berkeley	Mechanical Engineering	U. Cal - Berkeley
Robert Neal Wiedenmann	IL	Purdue University	Entomology	Purdue Univ.
Daniel R. Wiederin	IA	Creighton University	Analytical Chemistry	Iowa State Univ.
Thomas C. Wigginton	FL	U. of Florida	Forestry	Yale University
Deborah Ann Wilcox	NY	Rochester Inst Tech	Botany	U. Wisc - Madison
Timothy S. Wilkinson	CA	U. of Washington	Electrical Engineering	Stanford Univ.
Lynne Catherine Willis	MI	U. of Michigan	Genetics	U. of New Mexico
David Alfred Willming	MO	U. Missouri - Rolla	Electrical Engineering	U. of Illinois
Christine Diana Wilson	CA	U. of Toronto	Astronomy	Cal Inst Tech
Robin Katherine Wilson	CA	Cal Inst Technology	Genetics	Cornell University
Drew Eric Wingard	TX	U. of Texas	Electronics Engineering	Stanford Univ.
Elizabeth Susan Wolf	CA	U. Cal - Berkeley	Computer Science	Stanford Univ.
David S. Wolfe	MA	Cornell University	Computer Science	U. Cal - Berkeley
James K. Wolfenbarger	NV	Oregon State Univ.	Chemical Engineering	Cal Inst Tech
David Judson Wood	TX	Princeton University	Geology	Stanford Univ.
Tracey Jean Woodruff	CA	U. Cal - Berkeley	Biological Engineering	Mass Inst Tech
Gregory Scott Woodward	TX	Texas A&M University	Mechanical Engineering	Stanford Univ.
Susan Gail Worst	WI	Washington Univ. (Mo)	Biochemistry	Harvard University
Daniel Scott Wovcha	MI	Gustav Adolphus College	Biology	U. Minn - Mineapls
Lisa Anne Wrischnik	CA	U. Cal - Berkeley	Biochemistry	Mass Inst Tech
Robert Alan Wyttenbach	KS	U. of Kansas	Neuroscience	Cornell University
Michael Thomas Yamada	CA	Cal Inst Technology	Organic Chemistry	Harvard University
Alan Akihiro Yamamura	MD	Mass Inst Technology	Electrical Engineering	Mass Inst Tech
Robert M. Yandrofski	CO	Colorado School Mines	Solid State Physics	Stanford Univ.
Sunia Isabelle Yang	CA	Stanford University	Electrical Engineering	Stanford Univ.
Douglas Eugene Yoder	PA	Penn State University	Engineering	Mass Inst Tech
Carol Kaesuk Yoon	MA	Yale University	Genetics	Cornell University
David Taesu Yoon	MI	U. of Michigan	Anthropology	UCLA
Neal Eric Young	IN	Cornell University	Computer Science	U. Cal - Berkeley
Paul Michael Young	NH	Cal Inst Technology	Physics/Optics	Harvard University
Edward Tsu-Wei Yu	NJ	Harvard University	Physics/Optics	Stanford Univ.
Peter Michael Yu	VA	Princeton University	Political Science	Harvard University
Carolyn Marie Zann	MI	U. of Michigan	Botany	Cornell University
Steven John Zimmerly	OH	Goshen College (Ind)	Biochemistry	Stanford Univ.
Adam Zweifach	NY	U. of Pennsylvania	Physiology	Yale Univ Sch Med

APPENDIX B
MINORITY GRADUATE FELLOWSHIP AWARDS
NEW AWARDS - FY86

NAME	HOME STATE	BACCALAUREATE INSTITUTION	FIELD	FELLOWSHIP INSTITUTION
Carol G. Acosta	CA	U. Cal - Irvine	Psychology	U. Cal - Riverside
Maria R. Acosta	DC	Georgetown Univ.	Psychology	U. of Virginia
Karen M. Aguirre	NY	Hunter College	Molecular Biology	Johns Hopkins U.
Enrique Amaya	NC	U. of No. Carolina	Molecular Biology	U. Cal - San Fran.
Carlos F. Barbas	FL	Eckerd College	Biochemistry	Texas A&M Univ.
Jesse R. Borges	NY	SUNY-Binghamton	Political Science	Harvard University
Jeffery T. Brown	PA	Univ. of Pittsburgh	Electrical Engineering	Purdue University
Judith A. Brown	NY	Princeton University	Chemical Engineering	Mass Inst Tech
Bertina A. Bryant	NJ	U.Md-Baltimore Co.	Linguistics	Johns Hopkins U.
Richard J. Castillo	CA	U. of Hawaii	Anthropology	Harvard University
Damian Costa	AL	Cornell University	Electrical Engineering	Stanford Univ.
Neta C. Crawford	WI	Brown University	International Relations	Harvard University
Ana K. Crespo	PR	Carleton College	Economics	Harvard University
Rita T. Duran	NM	Trinity University	Computer Science	Northwestern U.
Francisco J. Echegaray	PR	U. of Puerto Rico	Inorganic Chemistry	U. of Michigan
Scott V. Edwards	NH	Harvard University	Zoology	U. Cal - Berkeley
Alejandro D. Farinas	NJ	Rensselaer Polytech	Physics/Optics	Stanford Univ.
Jose A. Feito	FL	U. of Chicago	Social Psychology	Stanford Univ.
Catherine A. Fox	CA	U. Cal - Riverside	Biochemistry	U. of Wisconsin
Sigrid C. Gabler	CT	Harvard University	Archeology	U. of Michigan
Stanley O. Gaines	TX	U. Texas - Arlington	Social Psychology	U. Texas - Austin
Selma M. Gomez	FL	Harvard University	Math/Operations Res	Harvard University
Luke C. Harris	NJ	St.Josephs - Pa.	Political Science	Princeton Univ.
Yvette M. Huet	MO	U. of Kansas	Physiology	U. Kansas Sch Med
Jacqueline M. Hughes	OH	U. of Cincinnati	Applied Mathematics	U. Cal - Berkeley
Robert G. Lancaster	AR	Swarthmore College	Organic Chemistry	New York Univ.
Victor Leyva	CA	Cal Inst Technology	Physics	Cal Inst Tech
Chris N. Lillios	CT	Princeton University	Electrical Engineering	Mass Inst Tech
Silvia Lopez	PR	U. of Puerto Rico	Analytical Chemistry	Cornell University
Swen J. Magnuson	MT	NM Inst Min & Tech	Earth Sciences	NM Inst Min&Tech
Leticia M. Marquez	CA	Stanford University	Biology	Stanford Univ.
Marie C. Martin	FL	U. Texas - El Paso	Developmental Psychology	Mass Inst Tech
Jana L. Maxwell	OK	Oklahoma State Univ.	Inorganic Chemistry	U. of Arizona
Gary S. May	MO	Georgia Tech	Electrical Engineering	U. Cal - Berkeley
Carmen M. McIntyre	MI	U. of Michigan	Psychology	U. of Michigan
Susan M. V. Montgomery	MI	U. of Michigan	Chemical Engineering	Princeton Univ.
Carolyn V. Murray	OH	Carleton College	Sociology	U. of Wisconsin
Carlos E. Padilla	PR	Princeton University	Aeronautical Engineering	Stanford Univ.
Jaime R. Pericas	PR	U. of Puerto Rico	Political Science	U. of Wisconsin
Ricardo A. Pincheira	PR	Vanderbilt University	Computer Science	U. Cal - Berkeley
Christopher J. Pinon	CA	U. Cal - Berkeley	Linguistics	Stanford Univ.
Roberto E. Proano	NY	U. Missouri - Rolla	Materials Engineering	Cornell University
Joaquin J. Rivera	PR	U. PR - Mayaguez	Inorganic Chemistry	Stanford Univ.
Victor M. Rivera	VA	Princeton University	Molecular Biology	Harvard University
Marisol Rodriguez	PR	U. of Puerto Rico	Analytical Chemistry	U. Cal - Berkeley
Sylvia L. Sanders	KS	U. of Kansas	Biochemistry	Stanford Univ.
Robert M. Sellers	OH	Howard University	Personality Psychology	U. of Michigan
R. Drew Smith	IN	Indiana University	Political Science	Yale University
Valerie E. Taylor	IL	Purdue University	Electrical Engineering	Purdue University
Louis A. Thomas	MA	Yale University	Economics	Mass Inst Tech
John E. Tobin	CA	UCLA	Genetics	UCLA
Nivalso J. Tro	CA	Westmont College	Physical Chemistry	Stanford Univ.
John D. Villasenor	MD	U. of Virginia	Electrical Engineering	Stanford Univ.
Anthony D. Weathers	FL	Georgia Tech	Electrical Engineering	U. Cal - San Diego
Dennis F. Zaritsky	CA	Cal Inst Technology	Astronomy	U. Cal - Berkeley

APPENDIX C
NATO POSTDOCTORAL FELLOWSHIP AWARDS
NEW AWARDS - FY86

NAME	HOME STATE	BACCALAUREATE INSTITUTION	FIELD	NATO INSTITUTION
Gregory S. Boebinger	MA	Mass Inst Technology	Solid State Physics	Ecole Normale Superieur France
Timothy G. Bromage	CA	Univ. of Toronto	Biomechanics	U. College London London, England
Judith L. Bronstein	MI	Univ. of Michigan	Ecology	U. of Montpellier France
Christopher Capobianco	AZ	Arizona State Univ.	Geochemistry	Cambridge Univ. United Kingdom
Ines L. Cifuentes	MD	Columbia University	Seismology	Universite Pierre France
Heidi E. Dobson	CA	U. Cal - Berkeley	Entomology	Uppsala University Sweden
Jack F. Douglas	IL	Univ. of Chicago	Theoretical Polymer Physics	Cambridge Univ. United Kingdom
August E. Evrard	NY	SUNY - Stony Brook	Astronomy	Cambridge Univ. United Kingdom
Carolyn A. Foster	WA	U. of Washington School of Medicine	Cellular Immunology	Univ. of Vienna Medical School Austria
Rodney O. Fox	KS	Kansas State Univ.	Chemical Engineering	CNRS-ENSIC France
Joshua R. Ginsberg	NY	Princeton University	Zoology	Oxford University United Kingdom
Richard O. Gray	WA	Univ. of Toronto	Astronomy	U. of Copenhagen Denmark
Dennis W. Grogan	IL	Univ. of Illinois	Microbiology	Max Planck Inst. West Germany
Michael A. Grusak	CA	U. Cal - Davis	Botany	Univ. de Poitiers France
Candace H. Haigler	TX	U. Texas - Austin	Botany	Cambridge Univ. United Kingdom
Alan B. Harper	CA	U. of Washington	Zoology	Oxford Univ. United Kingdom
Jeffrey F. Harper	IL	Washington U. (Mo)	Cellular Biology	Univ. Regensburg West Germany
Judith G. Hochberg	CA	Stanford University	Linguistics	Center Natl. de Recherches Scien. France
Charles Hyde-Wright	MA	Mass Inst Technology	Nuclear Physics	Natl. Inst. voor Kernfysica en Hoge-Energiefysica The Netherlands
Lucia F. Jacobs	NY	Princeton University	Experimental Psychology	Univ. of Toronto Canada

APPENDIX C
NATO POSTDOCTORAL FELLOWSHIP AWARDS
NEW AWARDS - FY86

NAME	HOME STATE	BACCALAUREATE INSTITUTION	FIELD	NATO INSTITUTION
Steven A. Juliano	PA	Penn State University	Ecology	Univ. of York England
Sandra Knapp	NM	British Museum	Botany	British Museum England
Walter K. Kremers	PA	Penn State University	Probability & Statistics	Univ. of Augsburg West Germany
Werner G. Kuhr	MA	Indiana University	Analytical Chemistry	U. of Groningen The Netherlands
Gerald J. LaHoste	LA	INSERM Unite 259	Physiology	U. de Bordeaux II France
Phillip B. Liescheski	TX	U. Texas - Austin	Physical Chemistry	U. of Edinburgh United Kingdom
Steven L. Lima	MA	Simon Fraser U.	Behavioral Ecology	Simon Fraser U. Canada
Laura L. Lisiecki	MI	Northwestern U.	Materials	Riso Natl Lab Denmark
Paul J. Markovitz	OH	Case Western Reserve Reserve	Pharmacology	Oxford University United Kingdom
Charles M. Mate	OR	U. Cal - Berkeley	Solid State Physics	Cambridge Univ. United Kingdom
Michael P. Mattis	CA	Stanford University	Elementary Particles	Center d'Etudes Nucleaires de Saclay France
Margery L. Oldfield	TX	U. Texas - Austin	Fish & Wildlife	Univ. of Guelph Canada
James G. Omichinski	WA	U. of Washington	Environmental Science	Statens Inst. for Folkenelse Norway
Francis E. Putz	FL	U. of Florida	Forestry	Oxford University United Kingdom
Michael R. Rhum	CT	Harvard University	Social Anthropology	Center Natl de Recherches Scien. France
Frank C. Rohwer	MD	U. of Pennsylvania	Ecology	Queen's University Canada
Robert J. Scherrer	IL	Univ. of Chicago	Cosmology & Particle Physics	Queen Mary College United Kingdom
Erika Schneider	CA	U. Cal - Berkeley	Physical Chemistry	U. of Stuttgart West Germany
Jeffrey A. Schonberg	NY	Rensselaer Polytech	Chemical Engineering	Cambridge Univ. United Kingdom
Scott A. Stevenson	OR	U. of Wisconsin	Physical Chemistry	Univ. of Munchen West Germany

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NATO POSTDOCTORAL FELLOWSHIP AWARDS
NEW AWARDS - FY86

NAME	HOME STATE	BACCALAUREATE INSTITUTION	FIELD	NATO INSTITUTION
Scott M. Thompson	NY	Stanford University	Neurobiology	Univ. of Basel Switzerland
Robert T. Tranquillo	NC	U. of Pennsylvania	Applied Mathematics	Oxford University United Kingdom
Arleen M. Tuchman	FL	Freie Univ. of Berlin	History & Philosophy of Science	Freie Univ. of Berlin West Germany
Donald K. Wagner	IN	Purdue University	Operations Research	Univ. of Bonn West Germany

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Presidential Young Investigators 1986 Awards (NSF 86-37).

College Science Instrumentation 1986 Awards (in preparation)

Summary of Grants, FY 1984-86; Research in Teaching and Learning Program (NSF 86-84).

Summary of Grants, FY 1984-86; Instructional Materials Development Program (NSF 86-85).

Summary of Grants, FY 1984-86; Informal Science Education Program (NSF 86-86).

Summary of Grants, FY 1984-86; Applications of Advanced Technologies Program (NSF 86-87).

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Grants for Research and Education in Science and Engineering (NSF 83-57, revised 1/87).

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